BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 23.] 1926. [No. 2.

YAWS AND SYPHILIS: A CRITICAL REVIEW.*

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Goundou.

During recent years the question of the pathogeny of goundou has been reopened, and evidence in favour of this condition being a manifestation of yaws has been adduced. Durante and Roy (1920) have given an account of their histological findings in a case of goundou. The swelling they state is neither an exostosis nor an osteitis, but an inflammatory new growth probably due to an organism of low pathogenicity. Tournier (1922) relates the case of a boy of 6 years who developed goundou 6 months after an eruption of yaws and a year previous to being seen. There was also osteitis of the mandible, radius, ulna, tibiae and tarsus, trophic changes in the nails and Hutchinson's teeth with old dental malformations. Under treatment, while the other bony manifestations retrogressed, there was no change in the paranasal swellings. Clapier, working in the French Congo, believes that goundou is a manifestation of yaws.

It is to Botreau-Roussel (1925), however, that we owe in the first place a most remarkable monograph on this condition, and to that author and Cornil (1924), for a studied account of the histopathological changes found in 8 cases from the Ivory Coast, where Botreau-Roussel saw 130 cases and operated on 113 in a single year. There is also a report by this observer upon a 15-year-old male skeleton now in the Dupuytren Museum in Paris showing osteitis of long bones and goundou. Everyone interested in this condition and its suggested relation to yaws should read the monograph with its wonderful set of photographs. It cannot be said that a yaws pathogeny for goundou has been proved, but the evidence is most suggestive. Roy (1925), in an article on goundou recently published, unaware apparently of the above-mentioned monograph, believes that goundou is still of unknown etiology, and while excluding syphilis and other diseases as possible causes equally has no hesitation in asserting that the condition is not due to yaws. He describes in haematin-eosin and safranin stained sections of a goundou tumour the occurrence of some three oval bodies

* Continued from page 1.

(K2827) Wt. P 157/183 1,625 2/26 H & Sp Gp 52 6

25–30 μ in diameter. They are mentioned without insisting on their possible significance. On the other hand, when the contents of this paper are studied, there is much evidence on the author's own showing to uphold Botreau-Roussel in his thesis. Not the least important point brought to light by this observer was the fact that he saw only two cases of goundou in 4 years until he operated on a case giving great relief to the patient, an episode followed by the appearance of 130 cases in 12 months. Compare this narrative with the statement which occurs in the Annual Medical Report, Uganda, for 1923, to the effect that a case therein reported is the first to be observed in Uganda. Goundou in its minor forms is a condition for which treatment is not sought, and many often passed unnoticed. The cases require to be sought for or attracted to the observer by some means as happened to the writer of the monograph. It would be useful if every case seen were reported with as full details as possible in the light of Botreau-Roussel's observations. For those who are unable to consult the original a summary of this monograph, and also of Roy's paper, appeared in this *Bulletin* [Vol. 22, pp. 421 & 650.].

Juxta-Articular Nodules.

The pathogeny of the well-known and widely distributed condition thus described remains uncertain. There has, however, been a gradually increasing tendency to regard it as a manifestation of syphilis or yaws. Davey (1913), who was, I think, the first observer to suggest a framboesial etiology for J.A.N., in the lower Dedza district of Nyasaland, found 80 out of 964 male, and 1,414 female adults examined consecutively exhibiting juxta-articular nodules (no cases among 567 children). In this area yaws was very prevalent, and with the exception of 8 all the 80 admitted yaws and showed signs of having had the disease. Some of the 8 also showed signs of having had the disease, and he says it is probable all had done so. While thus among those persons with juxta-articular nodules 90 per cent. certainly, and 100 per cent. probably had had yaws, among the rest of the population 15·5 per cent. had a history or signs of having had the disease. Spittel (1922) believes juxta-articular nodules to be a part of yaws in Ceylon. Clapier (1900) found, in one area of the Congo, 29 cases among 500 persons examined; all said they had had yaws, and none showed signs of syphilis; the author is, however, cautious in drawing any conclusion. Botreau-Roussel mentions no cases in his monograph on framboesial osteitis and goundou. Jessner (1924) gives a general account of the condition with a useful bibliography. Foley and Parrot (1921) report 21 cases observed in Algeria, and all give a number of references to other cases. Onorato (1924) 9 cases in Tripoli. Jamin (1925) a case in Tunis. Cange and Argaud (1922) give a review of the literature and range themselves with those who believe in a syphilitic origin. Nogue (1921)(1922) met with 8 cases in Dakar, where syphilis is rife, but yaws absent. He also refers to two other cases; in one the nodes disappeared under N.A.B. treatment, in the other they were refractory. Decrops and Crambes (1923), in Morocco, where syphilis is rife, saw 16 cases of juxta-articular nodules; they also noted this condition in a Moroccan woman recently infected with syphilis with no response to antisyphilitic treatment. Dekester and Martin (1923), in Algeria, comment on 16 cases, observing that the condition is generally found in syphilitics, but Gros

(1907) only found 12 cases in 10,000 patients examined. REMLINGER (1923) met with this condition in a Spanish resident in Tangier who showed no sign of syphilis but admitted gonorrhoea.

DA MATTA (1921) believes juxta-articular nodules to be syphilitic manifestations, founding his opinion on the good results obtained in treating them with antisyphilitic remedies. He also discusses the priority in the discovery of the condition which was described by LÜTZ in Brazil, in 1892, and by JEANSELME, in Indochina, in 1909. BRODEN and BERNARD (1925) describe the case of a Belgian resident of the Congo with no history or clinical manifestations of yaws or syphilis, but with a strongly positive Wassermann Reaction, findings common to 6 out of the other 9 cases of Europeans recorded in the literature. This case responded to treatment with sulpharsenol and bismuth. These European cases, excluding that reported by REMLINGER in 1923 mentioned above, are: GIBLIN (1915), DE BRAULT (1916), DE GOUGEROT-BURNIER-BONNIN (1920), POUPELAIN (1920), BROUARD (1923), MORIN (1924), all in persons who had been in the tropics, DE QUERVAIN (1920), GOUGEROT) 1924), 2 cases who had never lived in the tropics. BRODEN and his colleague, referring to site, give the order of frequence as trochanter, external malleolus, anterior tibial tuberosity, head of fibula, dorsal aspect of digits, acromion, sacro-coccyx, ribs. They quote MONCAREY as stating that near Basoko, Congo, juxta-articular nodules is a common condition among the natives, that yaws is widespread and syphilis very rare, also YERNAUX, who states that in New Guinea, where the condition is common, the natives always distinguish between syphilis and yaws, and attribute it to the latter. NOEL (1925) has recently reported another case of a European woman seen in India, but who had resided in N. Africa.

VAN DIJKE and OUDENDAL (1922)(1923), in Dutch East Indies, and SOBERNHEIM (1924) of Berne have demonstrated spirochaetes in the nodes, GOUGEROT a fungus which he placed under Nocardia, others again including OUZILLEAU (1913), what were believed to be filarial elements. LE DANTEC would explain these findings by suggesting that the causes may be multiple, but that juxta-articular nodules only develop where they do because these are sites of pressure. MONCAREY supports this hypothesis, and believes that trauma determines the site of the lesions.

EGYEDI (1925), writing upon changes in joints, tendon-sheaths and bursae due to yaws as observed among the natives of Nias, an island near Sumatra where 80 per cent of the population suffers from yaws, but where syphilis is unknown, believes that those lesions which develop in bursae give rise to juxta-articular nodules. He notes, as others have done, that the tumours may caseate, become calcified, or break down and discharge their contents. Old lesions he found resistant to salvarsan treatment, but those in an earlier state of evolution responded to these injections.

GUTIERREZ (1925) has recently described cases from Manila with histological findings, and has done well to call attention to the fact that juxta-articular nodules must be differentiated from the "subcutaneous fibroid syphilomas" described by WEBER (1920), lesions which, as pointed out by GOODMAN and YOUNG (1920), and referred to by FOX (1922), closely resemble juxta-articular nodules, but which can be distinguished histologically. It would appear probable, therefore, that lack of appreciation of these facts has led many observers among those quoted above to make an incorrect diagnosis, and that a diagnosis

unsupported by histological examination in the absence of a history above suspicion, must remain a doubtful one. Both sets of lesions, so long as they have not reached an advanced stage of fibrosis, respond to treatment by salvarsan.

Du Bois (1925) points out that, on the other hand, there is some danger of including under the term juxta-articular nodules a somewhat similar condition due to the cyst of Onchocercus, and demands a more careful differential diagnosis. He found true juxta-articular nodules common in the Middle Congo, but rare in Uélé and Kasaí. In Mayumbé, among 3,000 individuals examined, 1–2 per cent. showed the condition, and he points out that here yaws is widespread, that gangosa and other bony lesions of framboesial origin are common and goundou occurs, but is more rarely seen.

Gangosa.

The etiology of this condition remains unsettled—it appears to be found in most if not in all endemic yaws areas, but it appears equally difficult to exclude syphilis, although the majority of writers include it as a manifestation of the former disease.

Powell believes it to be syphilitic ; Bercovitz (1922) reports the case of a woman in Hainan who admitted syphilis, but yaws could not be excluded. Hunt and Johnston remark that this condition with very serious mutilation as seen in Guam is never seen in Samoa, but they record 6 cases of a lighter form from there. The disease is noted by Wilson in Haiti, and Crichlow in the Solomon Islands ; it is said to be very common in the New Hebrides, by Nicolas in Manila, van Driel (1922) in Sumatra, and Gutierrez in the Philippines, the two latter believing in a yaws pathogeny. More recently van Dijke, Bakkar and Hoesen (1925) have discussed cases observed among Javanese and they come to the conclusion that the condition is the result of yaws and not syphilis. In the Congo, Dubois found gangosa common in association with yaws, Beurnier and Clapier found that every village had its one or two cases, and incline to a belief in syphilitic origin. Holland reports a case in Baluchistan, Waar a case in Borneo in a woman from a district where syphilis is very rare who had, however, had yaws. Neosalvarsan arrested the process, as it practically always does. In Tanganyika Territory, in 1922, at a clinic 1 case in 3,123 persons was seen. In Kenya, Callanan reports the finding of the condition in 4 per cent. of his adult cases of yaws. In 1923, 10 cases are reported from Moshi and 1 from Mwanza. Cases have been seen in various other parts of East Central Africa. Maxwell says the disease is not uncommon in Formosa, where syphilis is rampant among certain elements of the community, but yaws unknown ; he believes the condition to be a manifestation of syphilis. Gangosa has been reported in other parts of the world where yaws is said to be non-existent, but syphilis present, and the balance of evidence points to the latter disease being the chief or perhaps the only cause. Nogue and Lhuerre (1925) describe the case of a Toucouleur in whom yaws could be excluded who suffered from a condition resembling gangosa together with arthritis of the right knee and osteo-periostitis of the left tibia.

Syphilis.

The wide distribution of syphilis among native races may to some extent be recognized from the geographical survey given above ; at

the same time it is very incomplete and reflects upon our lack of knowledge of this subject, and indicates to some extent that in many countries little or nothing is being done to tackle the problem. The figures are again vitiated by the impossibility in many cases of making a differential diagnosis from yaws, and by what appears to be a biased opinion of some observers in favour of one or the other disease. The prevalence of syphilis is often unrecognized in native communities which lie far away from centres of administration; cases do not seek treatment, but lie hidden in their villages, and they have to be sought for to be found. The establishment of native dispensaries and clinics for treatment in native areas will do much to cause these cases to emerge from their hiding places.

Symptomatology.—A most interesting comparative study of syphilis as seen in whites and negroes attending the Johns Hopkins Dispensary contributed by ZIMMERMANN (1921) should be compared with the paper by BAETZ (1914), and these observations on the American negro with those of NOGUE (1924) at Dakar in Senegal, PIJPER (1921)(1924) at Pretoria in the Transvaal, ALLAIN and AUGAGNEUR (1923) in Madagascar, MCARTHUR (1923) in Bechuanaland, and KEANE (1921) in Uganda. ZIMMERMANN'S summary dealing with 596 male+297 female whites, and 521 male+429 female coloured people is as follows:—

"Extragenital infection is relatively infrequent in negroes; among coloured males and females, the age of infection is respectively one and two years earlier than in white males and females. Secondary syphilis in the negro is characterized by marked polyadenitis, by frequent and severe osteo-arthritic symptoms, by the frequency of iritis, and by the high incidence of follicular and pustular syphilides. A striking racial peculiarity is the frequent occurrence of the "annular papular syphiloderm."

"Bone syphilis is the most frequent lesion of tertiary syphilis in the negro, exceeding neurosyphilis, which in white patients comprised almost half of all late manifestations. Cardiovascular syphilis is more frequent in the negro, with an incidence of two to one in coloured and white males, respectively. Stricture of the rectum and elephantiasis vulvae are extremely common in the coloured female. Leucoplakia is rare in the negro, tertiary adenitis is common.

"Neurosyphilis is more frequent in white patients than in negroes. The negro is less likely to develop tabes or paresis, while the large group of unclassed cases of cerebrospinal syphilis is approximately of equal frequence in the two races. In negroes it is especially likely to manifest itself in the form of cerebrospinal endarteritis."

LEVY (1923) refers to the commonness of cardio-vascular syphilis among negroes in Texas. BAETZ has analysed 500 cases of syphilis among a total of 8,226 patients showing thus 6 per cent. of admissions for syphilis among negroes in the Canal Zone. He points out that a macular syphilide on the body will not bring the patient for treatment, but a pustular eruption on the face will do so. 277 out of 366 applying for treatment did so on account of pain, chiefly nocturnal, in the larger joints in 136, in bones 47. Of 366 cases showing no evidence of other disease 114 had fever. Adenopathy occurred in 88 per cent., genital chancre or scar in 65 per cent., the scar, however, often being due to chancroid, as it is recognized that a large proportion of cases never give a history of a primary chancre; arthritis, periostitis, exostosis (probably meaning nodes) in 60 per cent.; cerebro-spinal

lesions in 36 per cent. ; skin manifestations in 28 per cent. ; cardio-vascular disease in 10 per cent. ; gummata and visceral infiltration in 5 per cent. Of 301 cases with bone lesions, 131 showed exostosis of tibia, 88 subacute arthritis and bursitis, 32 acute periostitis of sternum and tibiae, 24 of sternum, and 18 of tibiae alone. No cases of tabes or G.P.I. were seen, but palsies of cranial nerves were noted, cerebral haemorrhage or softening in 13, epileptiform seizures in 6, ataxia in 7. In 50 cases of cardio-vascular disease, there were 10 of aortitis, 25 of aortic regurgitation, and 15 of aneurysm.

Nogue studied 400 cases in Senegal, and states that early ulceration in the throat is seldom seen ; the native seldom seeks treatment for condylomata, but chiefly on account of the nocturnal headache and bone pains of the early tertiary period ; polyadenitis is common. Tertiary lesions are often multiple, pleomorphic and widely scattered ; cases may often show visceral lesions and cutaneous manifestations at the same time ; cardio-vascular syphilis, especially aortitis, is common. No case of tabes or general paralysis was met with, but spastic paraplegia and hemiplegia were seen. The disease, he considered, is often acquired in childhood. Papular rashes predominated with a large proportion of a varioliform type. In 9 men and 9 women only were condylomata seen, about scrotum, vulva and anus. The commonest tertiary affection of the skin was a tuberculo-ulcerative lesion. Leucoplakia not uncommon ; osteitis noted as follows : Nose 29 (also 6 cases of congenital disease), frontal 2, sternum 8, clavicle 4, radius 4, ulna 6, phalanges 7, tibia 21, fibula 2, femur 1.

Pijper found that " rheumatism and neuritis " were the symptoms most complained of. Skin eruptions and condylomata in the secondary stage and later gummatous ulceration and disease of the nasal bones were most commonly seen. MacArthur seldom saw a primary chancre, but among children, who formed a large proportion of his cases, condylomata and tibial periostitis were common. In those over 14 years of age ulcerative gummatous lesions of the skin and naso-pharynx were most generally noted. No case of neurosyphilis was observed. This author believed that nearly all these cases were manifestations of the inherited disease, but it seems quite possible that they were child infections.

MacFarlane (1923) among many thousands of cases of syphilis in Basutoland in 28 years only twice observed a primary genital chancre. He believes the disease is less malignant now than in former years.

Keane, without giving further details, furnishes the following figures for 1921 in Uganda : Primary and secondary cases 608 males and 321 females ; tertiary and latent cases, 284 and 236 ; congenital disease, 84 and 130. Gilks (1924), alluding to the work at a venereal disease clinic in Kenya, makes no mention of congenital syphilis. He says among adults genital lesions are the rule, primary chancres among men and ulcerative lesions among the women, and only one case among some hundreds examined presented " anything like a secondary rash." The majority sought treatment on account of aches and pains. Among the children primary and secondary lesions of the genitals were commonly observed, but one is not informed whether these were sexual infections. Some observations by Stones in the Kavirondo district of Kenya are suggestive, but show some inconsistencies ; one may, however, deduce that Hutchinson's teeth and interstitial keratitis were not seen, though expected, and that cases of neurosyphilis were not observed.

DAVEY's figures for Tanganyika Territory show 716 primary, 1,638 secondary, and 253 inherited disease, without mention of tertiary cases.

For Madagascar we have only the year figures by ALLAIN (1924) :—

	1921.	1922.	1923.
Primary	63	387	785
Secondary	1,126	4,342	10,976
Tertiary	4,613	22,644	33,683
Inherited	592	3,281	6,133

From the colonies on the west coast of Africa there are practically no figures and no clinical observations to record. LOUYS, speaking of the Lower Ivory Coast, says that congenital syphilis is common among the children, who exhibit enlarged livers and spleens, dental irregularities, old iritis and large ulcers which respond to antisyphilitic treatment. ROY thinks that natives of North Africa have some immunity to syphilis ; ocular lesions are uncommon ; of 135 cases examined 16 had eye lesions, and of these he points out in only 1 was the posterior half of the globe affected. NOGUE, who found 6·8 per cent. of 850 school children at Dakar showing evidence of hereditary disease, says that keratitis and skin lesions among them were rare ; they suffered rather from rhagades, coryza, hepatic and splenic enlargement, osteitis, arthritis and hydrocephalus.

FORNARA (1922) relates 3 cases of cardio-vascular syphilis in Congo natives. LHUERRE and HUDELET (1923) the case of an abdominal aneurysm in a Buganda with no history of syphilis, and negative Wassermann reaction. BRISCOE (1918) reports a case of syphilitic hepatitis in a negro labourer, Panama Canal Zone. LEMAN (1921) believes negroes to be relatively immune to syphilitic affections of the pancreas compared with whites : MÜLLER and SOEKATON (1923) found among 459 necropsies on Javanese 19 cases of syphilitic orchitis. They believe that though syphilis is widespread it is benign in type among the Malays, on account of the rarity of congenital disease, of vascular manifestations and cases of neurosyphilis.

WRIGHT (1924) mentions the occurrence of ainhum in a subject with syphilis, and believes that the relationship is worthy of further consideration.

MONTEL states, in regard to tabes and G.P.I., that though syphilis is widespread in Cochinchina these affections are very rare and practically never seen in North China. At Canton both occur, chiefly in southerners ; at Singapore, Malays develop neither disease, but the Chinese do. On the other hand, syphilitic myelitis, spastic paraplegia and gumma of brain are as common as among Europeans. CHUN (1924), among 689 cases of syphilis, 71 per cent. having secondary lesions, observed that rheumatic pains were most commonly complained of, but no case of so-called parasyphilis was seen in 4 years.

THIROUX (1922) mentions G.P.I. and transverse myelitis as met with in Annam. GARTNER (1921), writing of the relative high incidence of G.P.I. in civilized as compared with uncivilized races, rather favours the theory, which others have also held, that explains the difference as due to intercurrent malarial infections in the uncivilized peoples. He holds that those who develop early marked skin lesions form "immunity bodies," which protect against G.P.I., while those who receive irregular early treatment develop "allergic weakness." Such a malarial theory receives, however, little support ; in Madagascar

it is definitely stated that malaria is severe in both children and adults, yet 182 cases of G.P.I. were admitted to hospital in a year, though only 3 cases of tabes were seen in the same period.

It has been stated that there is a native type of infection which does not give rise to parasyphilis—a dermotropic virus as opposed to a neurotropic virus, but CHRISTIDI (1922) remarks that though syphilis is a very mild disease among the Persians, and parasyphilis is never seen among them, yet of 20 European men who were infected from Persian women 2 developed G.P.I.

SÉZARY and ALIBUT (1922) similarly relate the histories of two Europeans who contracted the disease from native women in North Africa—the syphilis being of what he calls "native type," but they both subsequently developed tabes, showing, he says, that the virus may be both dermatropic and neurotropic. BRUN and DELAMERE (1923) mention the case of an Arab woman of Tunis who developed a Charcot's joint—left knee—with tabes. WILSON (1922) has published 2 cases of tabes in Nigerian natives. MCNAUGHTON (1924) has published an interesting series of cases of epilepsy in natives of Kenya who responded to treatment with antisyphilitic remedies, and suggests that all the many cases of native epilepsy are syphilitic. It is an interesting speculation, but by no means proved.

Reference has been made under yaws to HARPER'S claim (1925) that irido-cyclitis, transverse myelitis, aortic aneurysm, optic atrophy, tabes and G.P.I. are manifestations of that disease, a claim which doubtless will never be substantiated, but rather go to prove that syphilis among the Fijians gives rise to these conditions. He bases part of his belief apparently upon the fact that a primary chancre has never been recorded; as has been shown above, this is not an uncommon observation in native races. THIEME (1925), in dealing with nearly 10,000 native admissions to hospital in 9 years in Samoa, saw no case of Hunterian chancre, and similarly believes syphilis to be rare there.

Treatment.—Little need be said here about the treatment of syphilis among natives. Such treatment must lie along lines which experience in Europe has taught are best, but modified according to local conditions, including staff and funds available. General considerations of treatment are dealt with in a review by E. J. BURKE, in LACAPERE and LAURENT'S recent book, in the writings of LEVADITI, and in the literature of this country, including the articles by HARRISON. What, perhaps, is not sufficiently recognized by practitioners in the tropics, is the necessity for grasping the principles underlying treatment, and the rationale of the use of particular drugs in particular cases. The susceptibility of many native races to mercury is well known; the liability to stomatitis from this cause and bismuth as well has been observed in many countries; it is referred to in reports from Kenya, Uganda and Tanganyika, but no detailed collection of cases has been published. There is nothing to show whether it is a true idiosyncrasy or a complication due to an already existing gingivitis or pyorrhoea, a condition found in 100 per cent. of some tribes, or to latent scurvy or spirochaetal infection of the mouth.

VAN DEN ZIJL (1922), HAZEBROEK (1922), and HERMANS (1922) allude to the toxicity of arsenic compounds in natives with liver insufficiency due to various co-existent conditions, protozoal and helminth infections, etc., and it would appear that even greater care

than among whites is necessary in selecting cases for immediate treatment, and preparing others for subsequent treatment. No one, in dealing with native cases, records the prophylactic preliminary ingestion of glucose and the use of sodium thiosulphate as an antidote and prophylactic to poisoning by arsenic, bismuth and mercury does not seem to be widely known ; attention is drawn to articles by RAVAUT (1920), DENNIE and MCBRIDE (1924), SEMON (1924), HARRISON (1925) and BALFOUR (1924) upon this point.

The only paper dealing with the results of and accidents met with during treatment on anything like a large scale is by DECROP and SELLE (1923) using arsenobenzene derivatives in Morocco, wherein detailed observations on 80,000 intravenous injections in 10,000 individuals at Fez are given. It is a paper worthy of perusal by all those responsible for antivenereal campaigns among native races. There are some references in the annual reports from Uganda, Kenya and Tanganyika to the treatment there in use, but they are not detailed. The publication of statistics compiled from a long series of cases with detailed case notes and results of treatment would be most interesting.

The dangers attending the treatment of active cardiovascular syphilis with arsenical preparations are, of course, well known in this country, and LEVY concludes from the results of treatment with arsphenamin in 19 such cases among negroes in Texas that the dangers are very great indeed and the results nil.

A drug which may find a useful place in the treatment of syphilis as well as yaws, amoebic dysentery and malaria, is stovarsol, upon which a note appeared in the *Lancet*, 1925, Aug. 11, with references to literature. Tryparsamide has been favourably reported upon by LEES (1925) in the treatment of syphilis of the central nervous system, and might be worth a trial in the cases reported by MCNAUGHTON. LE ROY DES BARRES (1924) records three cases of secondary syphilis in Indochina treated with tablets of treparsol by mouth with excellent results, both clinical and serological, using the Baüer reaction.

In a recent article in the *Lancet* reference is made to the interesting fact that the llama alone among domestic animals has been found to be a carrier of syphilis, and to the investigations of MM. JAUREGUI and LANCELOTTI in Buenos Aires which go to show that the organism in the llama is identical with the treponema of man. The organism from each is infective for the other. The disease in the llama is etiologically and pathologically analogous with the human disease ; llamas develop late manifestations and tertiary affections, and die of general paralysis. The point of greater interest is, however, that llamas have been cured of their disease by inoculations of an attenuated virus. Further investigations will be carried out at the Pasteur Institute, Paris.

Serum Reactions.—The Medical Research Council Report No. 78 (this *Bulletin*, Vol. 21, p. 802) compares the Wassermann and Sigma reactions, the latter having many advantages, the chief disadvantage being that it is more laborious and more serum is required. OSMOND and MCCLEAN (1924) compare the Kahn and Wassermann tests in favour of the former and quote other authorities. The simplicity of the method has much to recommend it for workers in the tropics. G. STUART (1923) deals with results obtained in Palestine by Sachs-Georgi reaction, which he considers cannot replace the Wassermann reaction, but is useful within certain limits. HAZEBROEK (1924) gives

his experiences with Sachs-Georgi and formol test of GATÉ and PAPACOSTA. Work at the Federated Malay States Institute for Medical Research (1921) goes to show that the formol-gel reaction is useless as compared with the Wassermann reaction. WEBB (1922), in Uganda, finds the Sachs-Georgi test inferior to the Wassermann reaction, but useful in the tropics, where the latter is difficult to carry out. DE RAADT thinks it as useful as the Wassermann reaction. DAWSON and SMITH (1923) consider the Dreyer Ward test as reliable as the Wassermann reaction, but more tiresome to carry out. DUBOIS (1922) reports on Levaditi's test in Congo natives, DIACONO (1922) in North Africa on Vernes method, POLIDORI (1922) on modified Hecht-Baüer and Gaté-Papacosta tests. MOUCHET, VAN NITSEN and WALRAVENS (1921) tried the Bruck test, but report unfavourably, as it is often positive in malaria and remains positive in syphilis and yaws after the Wassermann reaction has become negative as the result of treatment.

COCHRAN (1923) makes some suggestions for performing the Sachs-Georgi test, and this method and the Wassermann reaction are discussed. HEINEMANN (1922) gives comparative results using Wassermann reaction, Sachs-Georgi and Meinicke's method among 2,000 Javanese labourers. He found conformity of precipitin reaction good, but conformity between the complement fixation reaction and precipitin reaction differs from the European standard and thinks this may be due to a malarial factor.

PERRY (1923) advocates a staple haemolytic serum for use in tropical countries for Wassermann reactions.

There are references to results obtained by Wassermann reaction and Sachs-Georgi in malaria by MARCIALIS, quoted by *Lancet*, Ap. 19, 1924, and HAROLD (1922) offers an explanation of the positives so obtained.

In this summary, given at considerable length, of the literature which has come for review in the *Tropical Diseases Bulletin* during the past few years many shortcomings will be obvious. They result from the very limited information available from some countries, from the scanty details given, from want of investigation and report of statistics in many colonies, from looseness in terminology in description, from misrepresentation of facts from want of special training on the part of the observer, etc.

This summary may do something, as mentioned in the opening paragraph, to demonstrate how great is the want of exact knowledge of these two diseases, their distribution, their incidence, their clinical manifestations, their pathological differences, a means of differentiation and, lastly, the best methods of treatment and most satisfactory manner of gauging the effects of treatment.

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* References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated. Dates in brackets are those of the original papers and do not always correspond with the date of the respective *Bulletin*. The list does not include all the papers referred to by the reviewer. A fuller MS. list can be consulted at the Bureau.

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KALA AZAR.

BALASUBRAMANIAN (T. S.). **Kala-Azar in the Ramnad District of the Madras Presidency.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 195–196.

In a recent paper CUNNINGHAM and PUNDIT (this *Bulletin*, Vol. 22, p. 685) called attention to an endemic focus of kala azar in the extreme south of India near Cape Comorin. The author of the paper under review now points out that another focus exists at Ramnad, a town on the east coast about 300 miles south of Madras and 150 miles north east of Cape Comorin. During 1922–1924 there came under his notice 28 indigenous cases of the disease. All came from villages on or near the coast.

C. M. Wenyon.

MICHAEL (D. F.). **Note on the Incidence of Kala-Azar on the Pusa Estate.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 131–139. With 1 map.

The Pusa Estate is the Headquarters of the Imperial Department of Agriculture. It comprises 1,400 acres, of which 400 acres are residential areas for the various staffs, and the remainder fields for cultivation of crops and experimental purposes. The Estate, which is surrounded by villages inhabited by peasants, is situated at the bend of the River Boor Gandak, 6 miles from the Pusa Road Station of the Bengal and North-Western Railway. The paper records observations on cases of kala azar on this Estate. The 69 cases were all in Indians, and of these 54 were in children. The infection was definitely a house one and associated with unhygienic modes of living. The spread by mechanical means appears to be worthy of consideration, though such a method of communication would not exclude an insect vector. The incidence of the disease is more marked between October and March during the dry season.

C. M. W.

MAZUMDAR (Benoylal). **A Report on 202 Cases of Kala-azar treated in Campbell Medical Hospital in 1923.**—*Calcutta Med. Jl.* 1925. July. Vol. 21. No. 1. pp. 10–13.

No unusual features were noted. The age incidence of the 202 cases was as follows: Under 2 years, 1; 3–10 years, 43; 16–30 years, 106; 31–50 years, 50; over 50 years, 2.

C. M. W.

VILLAIN (G.). Note sur le kala-azar du Honan (Chine centrale). **Kala Azar in Honan.**—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 669–676. With 1 text fig. [1 ref.]

A description of 7 cases of kala azar in Honan, China, where the disease is already known to be endemic. An examination of numerous ulcers has failed to demonstrate the existence of oriental sore in this locality, though Phlebotomus occurs there during the hot season.

C. M. W.

Kassirsky (J. A.), Mosheiko (W. M.) & Fedulow (A. W.). Ueber Leishmaniose bei Erwachsenen in Turkestan. [**Leishmaniasis in Adults in Turkestan.** —*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Aug. 1. Vol. 29. No. 8. pp. 368–379.

This paper gives a description of 10 cases of kala azar patients varying in age from 14 to 34 years. Treatment was carried out with tartar emetic and neosalvarsan. It was successful in 8 of the cases.

C. M. W.

Burnet (Et.) & Masselot (F.). Deuxième cas de kala-azar chez l'adulte en Tunisie. **Kala Azar in the Adult in Tunis.**] —*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 397–399. [3 refs.]

—— & ——. Un cas tunisien de kala-azar de l'adulte.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. June 18. Year 41. 3rd Ser. Vol. 49. No. 21. pp. 899–903. With 3 charts in text. [3 refs.]

——, ——, Calamida (F.) & Ortona (C.). Trois cas de kala azar chez l'adulte en Tunisie.—*Arch. Inst. Pasteur de Tunis.* 1925. July. Vol. 14. No. 3. pp. 331–339. With 6 charts in text.

The first and second of these papers describe the second case of kala azar in an adult in Tunis. The patient was a woman 39 years of age who was a nurse at the French Civil Hospital. The third paper records another similar case in a man 22 years of age, and gives some details of the three adult cases noted in this locality. The first case in an adult in Tunis was noted a few months ago (this *Bulletin*, Vol. 22, p. 688).

C. M. W.

Christophers (S. R.), Shortt (H. E.) & Barraud (P. J.). **Further Observations on the Feeding of Sandflies, *Phlebotomus argentipes*, on Cases of Indian Kala-Azar.** —*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 159–165.

The experiments recorded in this paper are a continuation of those previously noted (this *Bulletin*, Vol. 22, pp. 193 and 683). Of 53 flies fed on kala azar cases 14 showed flagellate infections. The latest time after feeding that any fly found positive has been dissected is the 5th day. The most noticeable feature of these further experiments has been the very heavy infections of a number of 5th day flies. Furthermore, many of the flagellates are attached to the gut wall by their flagella, a condition commonly seen in natural flagellate infections of insects. In the 5th day flies the infection is either a heavy one or does not occur at all. As in the first series of experiments, the flies as a rule feed only once and die on the 5th day. A few flies have, however, been induced to feed a second time on the 4th day and one of these has survived to the 7th day. In a note added to the paper it is stated that in one 5th day fly the flagellates had extended into the hinder end of the pharynx. They were present in considerable numbers in the œsophagus. In another fly dissected on the 6th day 3 flagellates were seen attached by their flagella to the membrane on the anterior

surface of one of the maxillae. Several flagellates were also detected in the loose membrane of the labium. It is recognized that the flagellates may have attached themselves during dissection.

C. M. W.

Lloyd (R. B.), Napier (L. E.) & Smith (R. O. A.). **The "Blood Meal" of *Phlebotomus argentipes* identified by Precipitin Antisera.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 811–817. [5 refs.]

The local occurrence of kala azar in one particular area of Calcutta and not in another naturally suggested a comparison of the two areas in respect particularly of their animal environment. In both areas the soil was polluted by droppings of domestic animals; in the "endemic" area the domestic animals were mainly fowls, ducks and animals other than cows, few cows being kept; in the "non-endemic" area (a Hindu area) they were mainly cows. In both areas species of Phlebotomus were existent, and among them *P. argentipes*—the only species that could be got to feed on man and the one that was found easy to infect in the laboratory when fed on kala azar patients. The Method of Difference could not therefore explain the epidemiology, unless some difference in the behaviour of *P. argentipes* could be discovered in the two areas.

One of the present observers (L.E.N.) suggested that *P. argentipes* might breed in soil promiscuously polluted by animals, but might feed *by preference* on one particular species of animal found abundantly in one area and not in the other, only feeding on man when that preferable species (cow) was not—or not easily—obtainable. Actual observation went some considerable way towards confirming this hypothesis: *P. argentipes* was found in both areas—though most abundantly in the "endemic" area, but in the "non-endemic" area—the Hindu area, where the domestic animals were mainly cows—it was observed to "remain in the neighbourhood of the cows, depending entirely on them for food, and seldom, if ever, to invade the upper rooms" where the people slept.

The experiments now described go very much further in confirming the hypothesis that *P. argentipes* feeds by preference on cows, and falls upon man only when cows are in default. Fifty-two individuals of this species were captured—some in situations where the domestic animals did not include any cows; others where there were cows and men; and others where there were cows alone—and the blood in 39 of these was identified by means of antiprecipitin sera.

In 10 observations out of the first category human blood alone was demonstrated in 6, human and bovine in 1, and blood that was neither in 3. In 16 observations of the second category bovine blood alone was demonstrated in 14, bovine and human in 1, and human blood alone in 1. In the observations of the third category bovine blood was demonstrated in all but 1, and human blood in none.

A. Alcock.

Christophers (S. R.), Shortt (H. E.) & Barraud (P. J.). *Culicoides* **and Kala-Azar in Assam.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 175–176. [2 refs.]

In Assam *Culicoides macrostoma* has been found to attack man. Of a number of these flies fed on kala azar cases 48 survived for 72 hours,

and 2 to the fourth day. Dissection of these did not reveal any flagellate infection, though they had fed on the same cases that gave an average of about 25 per cent. positive finds in the case of *Phlebotomus argentipes*.

C. M. W.

Shortt (H. E.) & Swaminath (C. S.). **Experiments to decide whether the Bed-Bug** *Cimex hemiptera*, **Fabr., can transmit Indian Kala-Azar.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 143–147. [2 refs.]

Attempts were made to transmit kala azar to 25 monkeys by means of bed bugs fed on kala azar cases. To each monkey was allotted a large test tube containing on an average 150 bugs in various stages of development. As casualties occurred in the tubes new bugs were introduced to replace those that had died. The procedure was to invert the tube on the skin of a kala azar case one or more times till the bugs had fed to repletion, and then, after the lapse of a few days, to allow them to feed on a shaved area on the abdomen of the monkey. After one or more feeds on the monkey the bugs were again fed on a case of kala azar. The time occupied in these experiments was from 6th December, 1923 to 9th March, 1925, and most of the monkeys were subjected to repeated biting for a period of about a year. In the case of 13 monkeys the experiments occupied from 317 to 392 days, the number of exposures to bites varying from 48 to 67; in the case of 5 monkeys it occupied from 218 to 290 days, the exposures varying from 26 to 41, while in the case of the remaining number the experiments were of shorter duration. In no case did a monkey become infected, though it was shown that 78 per cent. of this kind of monkey (*Macacus rhesus*) becomes infected by direct inoculation. The faeces passed by the bugs in the tubes were utilized for another experiment. On 112 occasions during 383 days the faeces of approximately 600 bugs which had fed on kala azar cases were fed to a monkey without any infection occurring. Between April, 1923, and March, 1924 cultures were made from the entire gut of 138 bed bugs taken from the bedding of kala azar cases. The cultures were uniformly negative.

C. M. W.

Nicolle (Charles) & Anderson (Charles). Recherches expérimentales sur le mode de transmission du kala azar. [**Experiments on the Mode of Transmission of Kala Azar.**]—*Arch. Inst. Pasteur de Tunis*. 1925. July. Vol. 14. No. 3. pp. 264–277. [2 refs.]

The experiments recorded in this paper deal with attempts to transmit kala azar from dog to dog by means of bed bugs. A virus was used which was proved to be capable of passage from dog to dog by inoculation. The experiments were of two kinds. In the first, two cages from which bed bugs could not escape were used. In each cage in which bed bugs were placed a heavily infected dog was kept for a week. The dog was then replaced by two young healthy dogs, which remained there for a week. The weekly alternation of infected and uninfected dogs was kept up for five to six months, fresh bugs being introduced from time to time, but it was found that the environment did not suit them, for they quickly died and disappeared. No infection of the healthy dogs occurred, but owing to the behaviour

of the bugs little reliance is placed on the experiment. In the second experiment batches of bugs were fed on infected dogs on the 1st, 3rd, 8th and 15th day of the experiment, and on 2 uninfected young healthy dogs on the 5th, 7th, 10th, 12th, 14th, 17th, 19th and 21st days. On the 7th, 10th, 14th, 19th and 21st days a number of bugs were crushed and the material smeared on a shaved and scarified area of skin, while others were opened with a needle and fed to the dogs. The experiment was repeated on 17 occasions during the course of 4 months. Each dog was bitten 2,150 times, was smeared with material from 130 crushed bugs and ate 320 bugs. The experiment was entirely negative and the authors conclude that even if the bed bug be capable of transmitting kala azar occasionally from dog to dog or from dog to man it cannot be regarded as the vector of the disease. Similarly, elaborate experiments were carried out by the authors with fleas (this *Bulletin*, Vol. 22, p. 194).

C. M. W.

Greig (E. D. W.) & Christophers (S. R.). **Infection of a Monkey (*Macacus rhesus*) with the Parasite of Indian Kala-Azar following the Introduction of Infective Material into the Lumen of the Small Intestine.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 151–157. [8 refs.]

A mixture of cultural forms of *L. donovani* and fresh parasites from the spleen of a case of kala azar was introduced into the upper part of the jejunum of a young monkey. A special technique had been devised to prevent contamination of the peritoneal cavity and wound with the organisms. Four months later the monkey was killed and found to be infected. Four other experiments of the same kind were made, but though it could not be definitely stated that they were free from criticism, no infection occurred. In the positive case the infection must have taken place through the intestinal mucosa.

C. M. W.

Shortt (H. E.) & Swaminath (C. S.). **Systemic Infection of a Monkey (*Macacus rhesus*) by Intradermal Inoculation of Spleen Puncture Material from a Case of Indian Kala-Azar.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. p. 149. [1 ref.]

A monkey was inoculated intradermally in the right eyebrow with about 0·5 cc. of diluted spleen puncture material from a case of kala azar. The monkey a year later appeared to be in good health, and was killed. Apart from an obvious enlargement of the spleen the organs appeared normal. Parasites were numerous in the spleen, less so in the liver, and were not found microscopically in the bone marrow. Cultures, however, were obtained from all these tissues.

C. M. W.

Christophers (S. R.), Shortt (H. E.) & Barraud (P. J.). **Our Present Knowledge regarding the Transmission of Kala Azar in Nature.**—*Proc. Assam Branch Brit. Med. Assoc. Ann. Meeting, Jorhat, 2nd Mar., 1925.* pp. 22–28. [8 refs.]

This paper discusses the possible methods of spread of kala azar and concludes by stating that *Phlebotomus argentipes* remains the chief suspect, as it is the only known insect in which the parasite multiplies with ease.

C. M. W.

Graham (J. D.). La commission du kala-azar dans l'Inde Britannique. **The Kala Azar Commission in British India.**]—*Bull. Office Internat. d'Hyg. Publique.* 1925. May. Vol. 17. No. 5. pp. 512–516. [1 ref.]

An account of the constitution of the Kala Azar Commission now working in India, its chief objective, the discovery of the method of transmission of the disease and the progress made in experiments with *Phlebotomus argentipes*.

C. M. W.

Manson-Bahr (Philip). **The Technique of Splenic Puncture in the Diagnosis of Kala-Azar.**—*Lancet.* 1925. July 11. pp. 70–71.

When the operation of spleen puncture for diagnosis of kala azar is done the author administers 1/100 gr. atropine about an hour before the operation, infiltrates the puncture site with novocaine and partially anaesthetizes the patient at the operation. The fluid in the needle is blown on to a slide and examined in a dark room by means of an electric torch held below the slide. The particles of spleen tissue are picked out and smeared on slides. In this way dilution of the material with blood is avoided and the parasites are obtained in greater concentration.

C. M. W.

Price (J. Dodds) & Strickland (C.). **The Significance of the *Splenic-Index* in *Kala-Azar* Endemic Areas.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 1–6. [3 refs.]

The question whether enlargement of the spleen due to causes othe than malaria can upset the accepted rule that a spleen index is an indication of the intensity of malaria is an important one, especially in kala azar areas. The authors of the paper find that rare pathological conditions are of no importance in using the spleen index nor is kala azar, unless the clinical signs of the disease are well-marked. In taking a spleen index for malariometry in kala azar areas, if the cases with well-marked symptoms of kala azar are excluded the spleen-index taken in conjunction with a parasite-index will give reliable information regarding the intensity of malaria. The conclusions are based on observations made in Assam tea gardens.

C. M. W.

Ling (W. P.). **Further Observations on the Fundus Oculi of Kala-Azar Patients.**—*China Med. Jl.* 1925. Aug. Vol. 39. No. 8. pp. 681–683. [2 refs.]

The author has already drawn attention to the occurrence of retinal haemorrhages in cases of kala azar which have marked secondary anaemia. The haemorrhages occur in all the layers of the retina. In the cases which were observed long enough there was complete absorption of the extravasated blood, the essential factor being diminution of the secondary anaemia.

C. M. W.

JEMMA (Rocco). A propos du kala-azar infantile dans la région méditerranéenne. [**Infantile Kala Azar in the Mediterranean Area.**]—*Paris Méd.* 1924. Aug. 23. Vol. 14. No. 34. pp. 155–159.

A remark by GIRAUD and ZUCCARELLI, who drew attention to the presence of kala azar in endemic foci in the South of France in Nice and Marseilles, to the effect that the treatment is still in its experimental stage, and that it is of importance to discover an antiparasitic which is truly active in order to combat the disease, leads the author of the paper under review to publish a protest. From his experience of over 600 cases of the disease in Italy, and the remarkable reduction in the mortality rate since the introduction of tartar emetic treatment, he is able to assert that the antimonial treatment is truly specific. The rules for the treatment of children have already been laid down by the author in his numerous publications on the subject, and he feels that the treatment employed by the observers named was so open to criticism that their statement regarding the inefficacy of tartar emetic was quite unjustified. The basis of his treatment is the bi-weekly injection of 1 per cent. solution of tartar emetic, commencing with a dose of 1 to 2 cc. till a maximum dose of 3 to 4 centigrams of the drug is given to children under 3 years of age, and a dose of 4 to 5 to children older than this. Intramuscular injections must be avoided, as also the substitution of other antimonial derivatives. If the treatment is carried out without intermission a cure can be assured in the great majority of cases in two to three months. As regards GIRAUD and ZUCCARELLI'S cases the first was treated when *in extremis* with intravenous injections of a 2 per cent. solution of tartar emetic; the second after 4 intramuscular injections of the drug developed necrosis of the muscles and treatment was abandoned; the third case had 10 intravenous injections of stibyl and died of broncho-pneumonia during a rest from treatment; the fourth was similarly treated and died of the same complication, while the fifth was at first treated intramuscularly with tartar emetic, then with arsenobenzol, and finally, when the end was near, with intravenous tartar emetic. The author feels that the failure cannot be attributed to the drug.

C. M. W.

PARADISO (F.). Due casi di Kala-azar infantile a sintomatologia ed associazioni morbose non frequenti. [**Two Cases of Infantile Kala Azar with Unusual Complications.**—*Pediatria.* 1925. Nov. 15. Vol. 33. No. 22. pp. 1228–1236. [18 refs.]

Two cases of infantile kala azar which were being treated with injections of tartar emetic in Catania appeared to respond very badly to the drug. It was found that malarial parasites were present, though none had been found before the treatment was commenced. One child died and the other was removed from hospital by the parents.

C. M. W.

SMYLY (H. Jocelyn). **Experiments on the Administration of Tartar Emetic by Various Routes.**—*Proc. Soc. Experim. Biol. & Med.* 1924. Dec. Vol. 22. pp. 201–203.

Intramuscular injections of tartar emetic in rabbits invariably cause necrosis and haemorrhage. In one human being it caused pain and

swelling. Intraperitoneal injections in rabbits caused so much irritation that it was not tried on human beings. Three cases of kala azar treated by rectal injections of the drug did not improve. The results of the investigation indicate that the intravenous route is the only one practicable for the administration of tartar emetic.

C. M. W.

Brahmachari (U. N.) & Judhisthir Das. **Chemotherapy of Antimonial Compounds in Kala-Azar Infection. Part XV. Further Observations on Certain Derivatives of P-Amino-Phenyl-Stibinic Acid.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 17–19.

—— & Maity (Bibhuty Bhusan). **Part XVI. Observations on Blood Culture of Kala-Azar Patients on NNN Medium during 1922-24.**—*Ibid.* pp. 21–24.

In a series of 440 cases of kala azar in which culture from the peripheral blood was attempted a positive result was obtained in 426. Culture from spleen puncture material of 190 of the cases was positive in all. In a second series spleen puncture showed parasites in 186. Culture from the peripheral blood was attempted in 160 of these cases with 154 positive results and culture from spleen puncture material in 170 cases with a positive result in all.

After the administration of urea stibamine and control of the peripheral blood by the culture method it was found in a series of 37 cases that the blood became negative in periods varying from 35 hours to 34 days. In 73 per cent. of the cases the blood became negative within 10 days.

C. M. W.

Brahmachari (Upendra Nath). **Chemotherapy of Antimonial Compounds in Kala-Azar Infection. Part XVII. Further Details of the Preparation of Urea Stibamine.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 111–112.

The process described involves: (1) Preparation of stibacetin; (2) hydrolysis of stibacetin to p-aminophenylstibinic acid, the sodium salt of which is stibamine; and (3) conversion of the latter to urea-stibamine. Parts (1) and (2) are already well-known. Part (3), which is the important part, is not given in sufficient detail to be useful, and adds nothing of importance to the description published already by the author (*Indian Jl. Medical Research*, 1922, Vol. 10, p. 508).

T. A. Henry.

Das (Sudhir Kumar). **"Stibosan" (von Heyden "471") in Private Practice.**—*Indian Med. Gaz.* 1925. Sept. Vol. 60. No. 9. pp. 425–426.

An account of 12 cases of kala azar treated with von Heyden "471" in private practice. All the patients who have been under observation for 3 to 14 months since the last injection are in sound health. Emphasis is laid on the rapidity with which the fever is checked, the short duration of the course of treatment, the rapid reduction in the size of the spleen, and freedom from harmful effects.

C. M. W.

Napier (L. E.). **Stibosan (von Heyden "471").**—*Indian Med. Gaz.* 1925. Oct. Vol. 60. No. 10. pp. 466–467.

In consequence of repeated letters asking for details regarding the use of stibosan (von Heyden "471") in the treatment of kala azar, the author has given the following directions. The drug is obtainable in sealed ampoules containing 0·2 or 0·3 gram. The required dose should be dissolved in sterile distilled water to make a 5 per cent. solution; *i.e.*, 0·05 gram will require 1 cc., 0·1 gram 2 cc., and so on. The solution should not be boiled and should be prepared freshly. An ampoule opened two years ago and kept in an ill-corked bottle at the ordinary Calcutta room temperature had not undergone any chemical change or increased in toxicity.

The dose for strong adults can be 0·2 gram at the initial dose, and 0·3 gram subsequently. Debilitated adults can be given 0·15 gram and 0·25 subsequently, while exceptionally weak patients should not have a larger initial dose than 0·05 gram. Children tolerate relatively large doses. At 3 years of age the maximum dose is 0·1 gram, at 9 years 0·2 gram, and from 12 onwards 0·25 gram. In children between 1 and 2 years of age intramuscular injections up to 0·1 gram can be given without causing more than slight local pain. A total of about 3 grams for an adult weighing 100 lb. is a little above the average sterilizing dose. The routine course of injections will be from 11 to 15. These should be given twice or three times weekly. Definite ascites should be a contra-indication to the use of the drug; chest complaints, traces of albumen in the urine, and diarrhoea are not contra-indications. If jaundice occurs injection can be discontinued for a short time.

The advantage of stibosan is that, in common with other pentavalent preparations of antimony, it makes it possible to effect a cure in about 12 injections instead of 30 or 40, which are usually necessary with antimony tartrate. The severe febrile reaction, the distressing cough, and the vomiting which so commonly follow administration of the tartrate are practically unknown when stibosan is used. Furthermore, it is stable, and does not change in contact with the air, so that it is not necessary to open a new ampoule each time a dose is given. Bottles containing 10 grams are supplied for hospital use, and the necessary amount for the day's doses can be weighed out and dissolved, the rest being kept for the next occasion.

C. M. W.

Rodrigues (Sebastian L.). **A Plea for Immuno-Therapy in Kala-Azar.**—*Calcutta Med. Jl.* 1925. May. Vol. 20. No. 11. pp. 421–431.

In this article the author suggests that kala azar should be treated not only with drugs, but with a potent vaccine capable of developing immune bodies. He argues from what he supposes to be the conditions in other Protozoal diseases, amongst which he includes rabies, smallpox, relapsing fever and syphilis, though spirochaetes are probably not Protozoa at all, while the causative organisms of the first two are unknown. Many of the statements he makes in support of his contentions are far from accurate, but, nevertheless, if such a vaccine as the one the author visualizes could be produced, it would undoubtedly be of value in the treatment of the disease.

C. M. W.

Dřbohlav (Jaroslav J.). **Studies on the Relation of Insect Herpetomonad and Crithidial Flagellates to Leishmaniasis. i. Inoculation of Mammals with Insect Flagellates. ii. The Specificity of the Various Insect Flagellates for Certain Hosts, as indicated by Cross Infection Experiments. iii. Cultivation Requirements.**—*Amer. Jl. Hyg.* 1925. Sept. Vol. 5. No. 5. pp. 580–597. [22 refs.]; pp. 599–610. With 10 figs. on 1 plate. [12 refs.]; pp. 611–621. [7 refs.]

i. The author has attempted to infect about 150 animals (mouse, rat, rabbit, dog, monkey and frog) with *Leptomonas ctenocephali* of the dog flea, *Crithidia gerridis* of the water strider, and *Herpetomonas muscarum* of flies (*Lucilia*). He has also inoculated plants of the genus Euphorbia with *L. ctenocephali*, *H. muscarum*, *Leishmania infantum* and *Trypanosoma rotatorium*. From the inoculated animals flagellates could be recovered up to three hours after inoculation and some rounded forms could be seen after six hours. In no case could flagellates be found in the plants, though it was shown they would remain motile for five days in the latex. In none of the animals or plants inoculated was there any indication of multiplication of the flagellates. The experiments have been carried out with the greatest care. Cultures have been repeatedly made from the blood and organs and careful post-mortem investigations made. It is concluded that the experiments indicate no etiological relationship between the insect herpetomonads used and leishmaniasis.

ii. The author has demonstrated what has long been suspected, viz., that the flagellate infections of the dog flea due to *Leptomonas ctenocephali* are due to larval infections acquired by the larvae ingesting the faeces of infected adults. The infection persists through the pupal stage and appears in the newly-hatched adult. Larvae can also be infected by feeding them on cultural forms of the flagellate. Uninfected adult fleas can also be infected with *Leptomonas ctenocephali*, but not with *Leishmania infantum*, *Herpetomonas muscarum* or *Crithidia gerridis*. Similarly, flagellate-free *Gerris remigis* did not become infected with *L. ctenocephali*, *L. infantum* or *H. muscarum*. Attempts to infect flies with *L. ctenocephali*, *L. infantum* and *C. gerridis* failed. On the other hand species of fly belonging to the genera *Musca*, *Fannia* and *Lucilia* all acquired infections with *H. muscarum*.

iii. From his experiences with the cultivation of flagellates in N.N.N. medium, the author was led to adopt a modified medium. The agar base is prepared as in N.N.N. medium, except that 0.3 per cent. potassium biphosphate was added as a buffer and the reaction adjusted to pH 6·6. The blood, which was either defibrinated or citrated, was diluted with an equal volume of Locke's solution containing 0·3 per cent. of glucose. To the melted agar in the tubes was added half the volume of diluted blood. The water of condensation, which separates after solidification, has a pH of 6·8. The requirements of different flagellates showed that *Leptomonas ctenocephali* grew best at pH 6·8, *Herpetomonas muscarum* at pH 5·4 to 5·6, and *Leishmania donovani* at pH 7·0. Growth is always greater on the surface of the agar above the water of condensation than in the liquid itself. Cultures of *L. ctenocephali*, *L. donovani*, and a trypanosome of the frog were kept for a year without subculture, after which successful subcultures were obtained.

C. M. W.

Christophers (S. R.), Shortt (H. E.) & Barraud (P. J.). **The Effect of Salt Solutions of Different Concentrations on the Parasite of Indian Kala-Azar.**—*Indian Jl. Med. Res.* 1925. July. Vol 13. No. 1. pp. 177–182. [4 refs.]

It is concluded that, though in the flagellate stage the parasite of kala azar is fairly resistant to changes in osmotic pressure, and able to develop in relatively low salt concentration, there is no indication of any probability that it can propagate in, or even withstand, the action of water. Milk, though suitable as regards salt concentration, does not appear to be a suitable culture medium.

C. M. W.

Christophers (S. R.), Shortt (H. E.) & Barraud (P. J.). **Temperature in Relation to Culture of *Herpetomonas donovani* on NNN Medium.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 167–171. [4 refs.]

An investigation on the temperature at which *L. donovani* will develop in culture has shown that in Assam it varies between 16° C. and 34° C. Heavy growths were obtained at temperatures of 22° C. to 30° C. The temperature conditions of Assam are such that culture at room temperature could take place during the greater part of the year.

C. M. W.

Mayer (Martin). Versuche mit Kala-azar-Erregern. [**Experiments with *L. donovani*.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Oct. 15. Vol. 29. No. 10. pp. 507–513. [18 refs.]

Obtaining a virus from a case of Indian kala azar the author has maintained *L. donovani* in mice for a period of eight and a half years, during which only 8 passages were made. The duration of the infection in the mice varied from 97 to 724 days. There did not appear to be any loss in virulence in successive passages. From a second case of Indian kala azar parasites were cultivated from the peripheral blood, and with these two successful passages in mice were made. The strain then died out. The culture from the peripheral blood was made by Row's method. In each of a series of tubes are placed 6 cc. of a solution of 2 per cent. sodium citrate in 0·85 per cent. sodium chloride. To each is then added 1 cc. of blood from a vein. After mixing the tubes are allowed to stand at room temperature (about 22° C.) for two hours. By means of a pipette the deposit of cells in each tube is transferred to one or two tubes of N.N.N. medium. By this technique every tube inoculated gave a growth of flagellates.

An attempt to transmit kala azar from one of the cases to mice by means of 30 *Ornithodorus moubata*, and 11 larvae and 3 nymphs of *Triatoma infestans* failed.

C. M. W.

Parrot (L.) & Lestoquard (F.). Sur quelques détails de la structure des *Leishmania*. [**Some Details of the Structure of the Leishmania.**]—*Bull. Soc. Path. Exot.* 1925. July 8. Vol. 18. No. 7. pp. 541–546. With 19 figs. on 1 plate & 1 coloured plate. [7 refs.]

By a special technique the authors have been able to demonstrate the presence of the rhizoplast in various leishmania. This structure

is frequently seen in ordinary dried films stained deeply by Romanowsky stain, but the technique recommended shows that it is constantly present.

The films are fixed in Schaudinn's alcoholic sublimate solution or in alcoholic iodine. If the first has been used, after 10 minutes' fixation they are transferred to the second. The films are then washed free of iodine in 95 per cent. alcohol, after which they are dried. They are then immersed in horse serum for 10 minutes and again dried in the air, after which they are stained with Giemsa stain. A plate shows the appearance of the rhizoplast and the method of its duplication when the parasite commences to divide. It is believed that the rhizoplast itself splits longitudinally, but the figures might be taken as indicating the formation of a new rhizoplast as an outgrowth from that half of the divided blepharoplast which has not the old rhizoplast attached to it. Attention is also called to the presence in films of various degenerate leishmania. These, which have been noted previously by various observers, consist of shells, which evidently represent the periplast of the parasites. In some the kinetoplast and rhizoplast, and even the nucleus, are still visible.

C. M. W.

Nicolle (Charles) & Anderson (Charles). L'immunité dans le kala azar expérimental du chien avec quelques données sur l'évolution de la maladie chez cet animal. Immunité naturelle et immunité par première atteinte naturelle. [**Immunity in Experimental Canine Leishmaniasis. Course of the Disease in the Dog.**]—*Arch. Inst. Pasteur de Tunis.* 1925. July. Vol. 14. No. 3. pp. 278–287. [2 refs.]

The maintenance of strains of *Leishmania donovani*, whether of human or canine origin, has shown that the animals usually recover after a few months, though intense and sometimes very intense infections can be demonstrated by examination of the bone marrow during this period. Dogs, however, vary in their response to inoculation. Certain animals acquire an acute and fatal form of the disease. Others pass into a cachectic condition and die at a time when recovery would be expected. There do not appear to be any cases of natural immunity. Animals which have completely recovered are immune to further inoculations, but it is not possible to state the duration of this immunity. In practice, if it is desired to maintain a strain of *L. donovani* in dogs, 4 to 6 animals should be inoculated on each occasion, and a similar number inoculated two and a half to three months later from the animal which shows the most intense infection.

C. M. W.

Césari. La leishmaniose canine en France. [**Canine Leishmaniasis in France.**]—*Recueil Méd. Vét.* 1925. Apr. 30. Vol. 101. No. 8. pp. 177–179.

Rozier (L.). Notes sur la leishmaniose canine.—*Ibid.* pp. 179–182.

For some years the dogs of Grasse, in Alpes Maritimes, South of France, have been liable to a disease of unexplained origin. The author of the second paper sent to Césari the femurs from two dogs, and in the bone marrow of both leishmania were found. It is evident that canine kala azar is a common disease of these animals in this locality. In France the disease in dogs has previously been noted only in Marseilles (see this *Bulletin*, Vol. 4, p. 398).

C. M. W.

Marzinowsky (E. J.). Zur Frage der Parasitologie und pathologischen Anatomie der Hundeleishmaniose. [**Parasitology and Morbid Anatomy of Canine Leishmaniasis.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 234–239. With 6 figs. on 2 plates.

This paper, without describing anything new, gives an account of natural and experimental kala azar in dogs as observed in S.E. Russia. A detailed description of a dog observed by the author in Bokhara in 1921 shows that this animal had a generalized leishmaniasis, as well as ulcerating lesions of the skin in which numerous parasites occurred. Sections of the margins of an ulcer showed that the infiltrating tissue was composed of epithelioid cells and fibroblasts, in both of which the parasites were found. They showed a tendency to be heaped round the nuclei and in the elongate fibroblasts they were arranged in rows, producing an appearance resembling the leishmania forms of *Trypanosoma cruzi* in muscle fibres.

C. M. W.

Row (R.). **Canine Leishmaniasis in Bombay.**—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. pp. 317–318. With 3 text figs.

The paper describes the case of canine leishmaniasis in a Punjab dog, which was noted by Avari and Mackie (this *Bulletin*, Vol. 22, p. 204). There were extensive ulcers on lips, ears, nose and inner canthus of the eye. On the inner surfaces of the ears were a number of non-ulcerated nodules, which resembled those which the author saw in a case of cutaneous leishmaniasis in an Indian soldier returning from Palestine during the War. An attempt made to obtain cultures of the parasites from the dog did not succeed. Mice were not infected by intraperitoneal injections, but two dogs inoculated in the skin of the ear contracted the disease. The author seems to think that the results of these experiments and the fact that the parasites appear larger than *L. tropica* justify the recognition of a distinct species.

C. M. W.

Adler (S.) & Theodor (O.). **The Experimental Transmission of Cutaneous Leishmaniasis to Man from** *Phlebotomus papatasii*.—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 365–371. [23 refs.]

Working in Palestine, the authors have found a *Herpetomonas* (*Leptomonas*) in *Phlebotomus papatasii*. In 1924, one of the authors (A.) found three flies infected. The flagellates were in all stages, from the non-flagellated to the long flagellated forms. Of a batch of 191 *P. papatasii* examined by the authors in 1925, one was infected with the same organism. The flagellates occurred in the oesophagus, oesophageal diverticulum, mid-gut and hind gut. They were most numerous in the anterior part of the mid-gut, where they were attached to the oesophageal valve, a conspicuous structure in these flies. With the flagellates from this fly a volunteer was inoculated by scarification on the forearm in two places on June 26th, 1925. On July 31st, 1925, a small papule was noted on one of the inoculated spots and in it leishmania were found. Nothing developed at the other spot.

The authors refer to the earlier records of flagellates in Phlebotomus. The reviewer discovered leptomonas in a fly of this genus in Aleppo in 1912. Later MACKIE (1914) reported 10 per cent. of *P. minutus* infected in Assam (this *Bulletin*, Vol. 5, p. 282). Recently, SHORTT has examined MACKIE's slides and finds that the flagellate is in reality a species of *Bodo* (this *Bulletin*, Vol. 22, p. 843). PATTON (1919, 1922) refers to flagellates in *P. papatasii* and *P. minutus* in Mesopotamia and Palestine, but he has informed the reviewer that he did not intend to imply that these infections had actually been observed in flies in these localities. The only authentic records of naturally occurring leptomonas infections of sandflies are those of the reviewer in Aleppo, the authors of the paper under review in Palestine, and LAVERAN and FRANCHINI (1920) in Italy.

As regards the correct name of the flagellate evidence appears to be accumulating that it is *Leishmania tropica* but, if this be not so, one of the other names proposed will have to be used. MACKIE (1914) gave the name *Herpetomonas phlebotomi* to the flagellate seen by him, but as this is in reality a species of *Bodo*, the name becomes a synonym of *Bodo phlebotomi*. It appears that the name *Herpetomonas papatasii* (*Leptomonas papatasii*) used by Adler, 1925 (this *Bulletin*, Vol. 22, p. 906), will be the correct one. The experiments recorded in this paper go a step further than those carried out by SERGENT, PARROT, DONATIEN and BÉGUET (1921), who produced an oriental sore on a man by inoculation of an emulsion of crushed *P. papatasii*, which, however, were not known to contain flagellates (*loc. cit.*, Vol. 19, p. 315).

C. M. W.

PARROT (L.) & FOLEY (H.). Remarques épidémiologiques sur le bouton d'Orient en Algérie. [**Epidemiology of Oriental Sore in Algeria.**]—*Bull. Soc. Path. Exot.* 1925. June 10. Vol. 18. No. 6. pp. 485–495. [22 refs.]

Recent observations have shown that the careful microscopic examination of all suspicious sores has gradually extended the known distribution of oriental sore in Algeria so that one is led to suspect that apart from the large towns no part of N. Africa can be regarded as free from the disease. The occurrence of isolated cases in certain localities is contrasted with the numerous ones which occur in recognized endemic foci, such as Biskra. The authors in their lengthy discussion on the epidemiology of the disease in Algeria believe that this difference is best explained on the assumption that the virus persists in the sandfly and that the disease incidence will be directly proportional to the density of the sandflies.

C. M. W.

FLYE SAINTE-MARIE (P. E.) & MANSOURI (A.). Deux nouveaux cas de leishmaniose cutanée observés chez des indigènes marocains dans la région de Fez. [**Two Fresh Cases of Dermal Leishmaniasis in Moroccan Natives near Fez.**]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 639–641. [2 refs.]

A record of 2 cases of oriental sore in the Fez district of Morocco. The first case from this district was noted by DEKESTER and MELNOTTE a short time ago (this *Bulletin*, Vol. 22, p. 206).

C. M. W.

Escomel (E.). Leishmaniose américaine des sinus frontaux. Traitement favorable par l'iodure double de quinine et bismuth. [**Leishmaniasis (American) of Frontal Sinuses. Successful Treatment by Double Iodide of Quinine and Bismuth.**]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 634–639. With 1 text fig. Previously published in Spanish in *Cronica Med.* Lima. 1925. May. Vol. 42. No. 743. pp. 129–132.

A woman, aged 40 years, was found to be suffering from espundia with extensive involvement of the nasal mucosa and frontal sinuses. The patient had visited Peru 15 years before, where, after a bite on the nose by some insect, a papule developed at the site. This increased in size and became an ulcer, which persisted for two years. After its disappearance nothing was noted for 13 years, during which the patient lived in towns of high altitude. She then began to have pain in the nose and frontal region. When seen by the author the end of the nose was hypertrophied and ulcerated, producing an appearance of yaws. The condition extended into the nose and sinuses. Diagnosis was made by the discovery of numerous leishmania in the exudates. The nasal cavity and sinuses were cleared out under local anaesthesia and treatment with emetine injections commenced. Little improvement was noted. Intramuscular injections of iodobismuthate of quinine, as recommended by Vigne and Pringault for the treatment of oriental sore, were then given. After 10 injections definite improvement had occurred. The external ulcer had healed and cicatrized, the pain and swelling in the frontal sinus had subsided, as also the intranasal ulceration. Unfortunately, the patient departed to her own country, so that it was not possible to judge whether a permanent cure had resulted. Nevertheless, the author feels justified in calling attention to the case, since in his long experience of the disease he has seen no case which has exhibited such rapid improvement.

C. M. W.

Rabello (E.). **Dermal Leishmaniasis.**—*Annaes Brasil. de Derm. e Syph.*, Rio de Janeiro. 1925. Jan. Vol. 1. p. 3. [Summarized in *Jl. Amer. Med. Assoc.* 1925. Sept. 19. Vol. 85. No. 12. p. 934.]

The author describes the mutilations which result from cutaneous leishmaniasis in Brazil as it exists at the present time, and compares it with those depicted on prehistoric pottery in Peru. He points out that 90 per cent. of the cases resemble oriental sore of the old world. They are mild, and spontaneous recovery commonly occurs. Any differences which occur in the remaining 10 per cent. are due to secondary infections, so that there is no justification for regarding the South American disease as a distinct entity.

C. M. W.

Schilling (Viktor). Zur Frage der Einschlusskörper (Chlamydozoa, von Prowazek). II. "Schollenleukozyten" im entzündlichen Gewebe der Orientbeule (Leishmaniosis furunculosa). [**Inclusion Bodies II. "Schollenleukozyten" in the Inflammatory Tissue of Oriental Sore.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 322–326. With 15 figs. on 3 plates. [4 refs.]

While examining sections of an oriental sore the author found that the leucocytes contained various types of inclusion bodies which were

similar to those which have been found in various diseases of unknown etiology; the leucocytes containing such bodies have been grouped under the name *Schollenleukozyten* [lump or globule leucocytes]. Their presence in the cells of an oriental sore in which the causative organism is well known and easily recognized disposes at once of the view that they are possibly parasitic in nature (Chlamydozoa) as some have maintained. The bodies are illustrated in three plates and have the appearance of globules or mulberry masses of small globules embedded in the cytoplasm of the cells.

C. M. W.

i. Gupta (Priya Nath). **Kala-Azar.**—*Indian Med. Rec.* 1925. Oct. Vol. 45. No. 10. pp. 319–325.

ii. Campos (J. J.). Leishmaniasis in Goa. (Conferencia feita na A.M.F.I.P.) [**Leishmaniasis in Goa.**]—*Bol. Ger. Med. e Farmacia.* Bastora. 1924. Nov. 9th Ser. No. 11. pp. 439–445.

iii. Wyllie (W. G.) (?) **Case of Kala-azar.**—*Proc. Roy. Soc. Med.* (Sect. for the Study of Disease in Children.) 1925. Nov. Vol. 19. No. 1. p. 5–6.

iv. Truffi (M.). Sulla Leishmaniosi cutanea. [**Oriental Sore.**]—*Giorn. Ital. di Dermat. e Sifilol.* 1925. Apr. Vol. 66. (Year 60). No. 2. pp. 679–703.

v. Pastore (R.). Un caso di bottone d'Oriente in un lattante. [**Oriental Sore in a Baby.**]—*Pediatria.* 1925. Aug. 1. Vol. 33. No. 15. pp. 842–844. [16 refs.]

i. A general article on the disease.

ii. An address on kala azar and a suggestion that cases imported to Goa from Bengal may lead to the establishment of local foci of infection.

iii. An obscure case which it was thought might be kala azar contracted in Malta in 1924.

iv. An essay or thesis on oriental sore based on five cases which came under the author's notice in Sicily.

v. A case of oriental sore in an infant one year old in Sicily.

C. M. W.

Chatterjee (K. N.). A Case of Kala-Azar with Transposition of the Viscera.—*Indian Med. Gaz.* 1925. July. Vol. 60. No. 7. p. 326.

Yagi (K.). Zwei Fälle von Orientalfurche der Leber bei Formosanern und Vergleichung derselben mit solchen bei Japanern.—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1925. July. No. 244. German summary pp. 3–4. [In Japanese.]

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

Lafforgue (M.). Contribution à l'épidémiologie du typhus récurrent. [**Epidemiology of Relapsing Fever.**]—*Rev. d'Hygiène.* 1925. Nov. Vol. 47. No. 11. pp. 963–979.

A review of the records of relapsing fever in various parts of the world has led the author to the view that the disease frequently occurs in atypical forms so that diagnosis can only be made by the discovery of spirochaetes in the blood. The disease, moreover, is a serious one, which should be controlled by the same measures as those employed against typhus fever.

C. M. Wenyon.

McCulloch (W. E.). **Relapsing Fever in Northern Nigeria A Study of 300 Cases.**—*Jl. Trop. Med. & Hyg.* 1925. Sept. 15. Vol. 28. No. 18. pp. 332–341. With 5 charts in text. [4 refs.]

The paper gives an account of relapsing fever in Northern Nigeria, which was first visited by the disease in 1924. The population was non-immune and lousy, so that there was no check to its establishment. As *Ornithodorus moubata* does not occur in the country the louse is undoubtedly the transmitting agent. Spirochaetes were found in lice taken from cases of the disease. As regards the clinical features of the disease the course is that of infections due to *S. recurrentis*. Jaundice, commencing on the third day, was present in 92 per cent. of untreated cases. A type of case referred to as the adynamic case was invariably fatal; in it the patient did not react to the infection by high fever. Superficially, it is very like yellow fever, and corresponds with the "bilious typhoid" of Griesinger in Egypt. The general mortality rate is about 57·7 per cent., and the disease has wiped out about 5·15 per cent. of the population of Kano Province. Treatment by neokharsivan is specific, and, excluding the adynamic cases which do not respond to the drug, it should reduce the mortality to 1 per cent. The first effect of the invasion was a fall in the birth rate owing to abortion. Later, with a fall in the monthly incidence of cases, the birth rate rose again, a fact which points to an active immunization of the population. It appears that infants are born with a passive immunity acquired from the mother. This explains the mild attacks in childhood, which will lead eventually to an immune adult population.

C. M. W.

Rigollet. Origine du typhus récurrent en Afrique Occidentale française. **Origin of Relapsing Fever in French West Africa.**—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 679–680.

The outbreak of relapsing fever which has gradually spread over the whole of Central Africa since 1921 has usually been ascribed to cases brought from Tunis or Syria. The author believes that there is reason to suspect that it originated in unknown foci in W. Africa.

C. M. W.

Reiter (Hans). Studien ueber die stumme Infektion und ihre Folgen im Experiment mit Rekurrensspirochäten. [**Occult Infection and its Results in Experimental Relapsing Fever.**]—*Deut. Med. Woch.* 1925. Aug. 21. Vol. 51. No. 34. pp. 1400–1402.

The observations described in this paper deal chiefly with the influence of occult infections in mice, due to spirochaetes of relapsing fever, on subsequent immunity. By injecting decreasing doses of cultural forms of the spirochaete into a series of mice it is possible to arrive at a dose which gives rise to no evident infection, but which produces an immunity resembling that which appears after an evident infection. The injection of killed spirochaetes gave rise to no immunity. If graded quantities of immune serum and infected blood are injected a dose can be discovered which gives rise to an occult infection. The immunity thus produced does not differ from that which results from mixtures which produce definite recognizable infections. The inoculation of the brain substance of mice which have recovered from evident or occult infections into other mice does not bring about infection. Similar results were obtained by the inoculation of the brain substance of mice cured by drugs. If the brain substance of a naturally recovered mouse is inoculated together with virulent blood a mild infection occurs. On the other hand, if the brain substance of a mouse cured by drugs is used instead the infection resulting is a particularly virulent one, the drug appearing to have destroyed any immune bodies present.

C. M. W.

Manteufel (Paul) & Worms (Werner). Ueber die Bedeutung der Perkutaninfektion für die experimentelle Spirochätenforschung. [**Percutaneous Infection. Its Significance in Experimental Relapsing Fever.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 225–233. [62 refs.]

The paper reviews the observations which have been made on the percutaneous infection of animals with the spirochaetes of relapsing fever, Weil's disease and syphilis and the trypanosome of dourine. It is pointed out that this method of infection throws light on various questions connected with the etiology, immunity and other problems of the various diseases produced.

C. M. W.

Karwacki (Léon). Les globules blancs dans la fièvre récurrente. [**The Leucocytes in Relapsing Fever.**]—*Presse Méd.* 1925. Aug. 26. Vol. 33. No. 68. pp. 1138–1139. With 2 charts in text.

From an examintion of the blood of 80 cases of relapsing fever in soldiers in Warsaw it was found that an attack was accompanied by a marked leucocytosis due chiefly to an increase in the polynuclears. After the febrile stage the leucocytosis gradually subsides. From the third day of the apyrexic period there is an increase in the lymphocytes at the expense of the polynuclears, while immediately before the next attack there is definite leucopenia associated with a lymphocytosis.

C. M. W.

Guerqué (A. A.). De l'état des ferments au cours du typhus récurrent. [**The Blood Ferments in Relapsing Fever.**]—*Jl. Physiol. et Path. Gén.* 1925. July. Vol. 23. No. 3. pp. 617–624. With 5 charts in text. [13 refs.]

As a result of the examination of the blood of patients suffering from relapsing fever the author has found that there occur marked variations in the ferments of the blood. The protease is reduced in proportion to the severity of the disease. A less marked change occurs in the catalase, so much so that in severe cases the catalase may be present in larger quantity than the protease. After a natural crisis the latter rises rapidly and the former more slowly. The same change occurs, but takes longer in a crisis brought about by treatment. Various physiological explanations of these variations are given.

C. M. W.

Galloway (I. A.). Cultures *in vitro* de *Spirochaeta duttoni* et de *Spirochaeta gallinarum*. [**Culture in vitro of** *S. duttoni* **and** *S. gallinarum*.]—*C.R. Soc. Biol.* 1925. Nov. 6. Vol. 93. No. 31. pp. 1074–1076.

The spirochaetes mentioned in the title were cultivated and maintained by sub-culture in the following medium. Small quantities of white of egg are placed in test tubes which are heated in the water bath till coagulation of the albumen has occurred, care being taken that is spreads over as extensive a surface as possible. To each tube 5 cc. of diluted rabbit or horse serum are added. The serum is first heated for half an hour at 58-60° C., and then diluted (with physiological saline?) to 1 in 5 in case of rabbit serum and 1 in 10 in case of that of the horse. A layer of oil is placed on the surface and the sterility controlled by incubation for 24 hours at 37° C. The addition of a drop of blood from a rabbit, monkey or human being helps the growth of spirochaetes, which flourish best at a temperature of 30–32° C.

C. M. W.

Seyfarth (Carly), Saraoff (Dimiter) & Kussitasseff (Konstantin). Experimentelle Untersuchungen ueber die Züchtung der Rückfallfieberspirochäten und ueber deren Verhalten im Gewebe. [**Cultivation of Relapsing Fever Spirochaetes. Their Behaviour in the Tissues.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 344–359. With 8 figs. on 1 plate. [19 refs.]

The authors have cultivated relapsing fever spirochaetes in a perfectly clear medium consisting of a mixture of 2 cc. of fresh sterile horse serum, 4 cc. of physiological saline solution and 1 cc. of a 0·5 per cent. solution of dextrose. The advantage of the medium is that the spirochaetes are easily studied by dark ground illumination. It was noted that in the strain of *S. obermeieri* studied the spiral was right-handed in all the organisms while in *S. duttoni* both right-handed and left-handed types occurred. The formation of knob-like structures on the spirochaetes was observed, but no evidence could be obtained that these were resistant or developmental forms. The only method of reproduction was transverse fission. Various types of degeneration of the spirochaetes occur in the blood and organs of infected animals.

The spirochaetes appear to accumulate in the spleen, while in the liver a destructive process occurs. The organisms were demonstrated in the parenchyma cells of the liver and in the grey substance of the brain, so that they are evidently not merely parasites of the blood.

C. M. W.

Mathis (C.) & Guillet (R.). Réceptivité de la souris grise au spirochète d'Obermeier. [**Susceptibility of the Gray Mouse to Obermeyer's Spirochaete.** —*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 680–682. [2 refs.]

It is usually claimed that the spirochaete of tick fever is more virulent to animals than that of the louse-borne disease. With the Senegal strain of the latter the authors have shown that the local grey mouse may be readily infected. If a number of animals are inoculated with one sample of blood the majority show only a slight subsequent infection but a few will develop an intense one. Attempts at sub-inoculating from animal to animal were not very successful as it was not possible to carry on a strain for more than two passages.

C. M. W.

Feldt (Adolf) & Schott (Alix). Empfänglichkeit junger und alter Mäuse für Recurrens. [**Susceptibility of Mice, Young and Old, to Relapsing Fever.** —*Ztschr. f. Hyg. u. Infektionskr.* 1925. Aug. 19. Vol. 105. No. 1. pp. 241–246. [4 refs.]

Adult mice fed with blood containing relapsing fever spirochaetes acquire heavy infections in 95 per cent. of cases. These infections are just as intense as those resultlng from subcutaneous or intra-peritoneal inoculations. Blood placed on the conjunctiva produces infections in only 36 per cent. of cases, and these are either very mild or of moderate intensity. The incubation period of infections resulting from feeding is on an average 3·5 days in young mice and 5·3 days in adult mice.

C. M. W.

Kroó (H.). Beitrag zur Biologie der Recurrensspirochäten. [**The Biology of the Relapsing Fever Spirochaetes.** —*Klin. Woch.* 1925. July 9. Vol. 4. No. 28. pp. 1355–1356.

Having a strain of the spirochaete of Russian relapsing fever which had been maintained in mice, the author fed clean *Ornithodorus moubata* on the animals. Later, an emulsion of the ticks was inoculated to mice and a strain of spirochaetes obtained from the ticks. It was found that animals which had recovered from an infection with either the original or the tick strain were not reinoculable with that strain, but could be infected with the other. The sojourn in the tick had transformed the spirochaete into a distinct serological type.

C. M. W.

Cunningham (J.). **Serological Observations on Relapsing Fever in Madras.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Mar. 19 & May 21. Vol. 19. Nos. 1 and 2. pp. 11–33. With 4 charts in text & 12 figs. on 2 plates. [47 refs.]

Working with the spirochaetes of Madras relapsing fever in experimentally inoculated squirrels, the author has noted that the

spirochaetes which occur in the blood during the first attack differ serologically from those which appear in the first relapse. Furthermore, those of the second relapse resemble those of the first attack, while those of the third relapse resemble those of the first relapse. There thus appears to be an alternation of two serological types. The tests were made by adding serum to blood containing spirochaetes and noting the presence or absence of agglutination with the dark field microscope. Spirochaetes were inoculated from human beings into monkeys, and then into squirrels in which the three strains on which the observations are based were kept. A first attack spirochaete is one which was recovered from man during the first attack, and handed on from animal to animal, the sub-inoculations always being made during the first attack. The first relapse spirochaete was obtained from an animal during its first relapse and then handed on from animal to animal, the sub-inoculations being made during the first attack. The second relapse spirochaete was similarly obtained during a second relapse and handed on as indicated above. It was found that the serum of an animal taken at the interval between the first attack and first relapse would agglutinate only the spirochaetes of the first attack and those of the second relapse, while the serum taken between the first and second relapses would agglutinate only the spirochaetes of the first and third relapse. These serological differences remain constant provided the sub-inoculations are always made during the first attack. If, after a number of passages, the sub-inoculation is made at the first relapse instead of at the first attack, the spirochaete changes to the other type. A number of experiments conducted with human sera indicate that the same alternation of types occurs in human beings. [The observations recorded in this paper are evidently an extension of those of Levaditi and Roché, Jancsò and others referred to in the paper by Brussin (see below).]

C. M. W.

Brussin (A. M.). Eine neue Immunitätsreaktion bei experimentellem Rückfallfieber. [**A New Immunity Reaction in Experimental Relapsing Fever.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1925. Sept. 30. Vol. 44. No. 4-5. pp. 328–346. With 2 text figs. [7 refs.]

The author points out that Rieckenberg (this *Bulletin*, Vol. 10, p. 56) first showed that the blood of an animal which had recovered from a trypanosome infection or had been cured contained substances of such a nature as to cause trypanosomes in citrated blood suspension to become laden with blood platelets when the serum containing the substance was added. If after apparent recovery from a trypanosome infection the animal relapsed, the relapse trypanosomes did not respond, the reaction only occurring with trypanosomes of the primary infection. To this substance the name "Thrombozytobarinen" was given. The author of the paper under review has noted that a similar reaction occurs in the case of spirochaetes of relapsing fever (*Treponema duttoni*). The serum of animals which have recovered or been cured of an infection contains a similar substance which causes spirochaetes of the primary attack to be coated with platelets. If spirochaetes of the first relapse are tested there is no reaction, so that it is evident that those of the first attack differ serologically from those of the first relapse. The author notes that Levaditi and Roché, Jancsò and others have

previously shown that the serum of animals recovered from the first attack was capable of agglutinating spirochaetes of the first attack even after passage through a series of animals, whereas it has no such effect on the spirochaetes of the first relapse. Similarly, the platelet reaction was positive for first attack spirochaetes even after several passages in animals. The observations recorded are of interest in view of those described by CUNNINGHAM (see above).

C. M. W.

i. STEINER (G.) & STEINFELD (J.). Experimentelle Untersuchungen zur Pathologie und Therapie der Spirochätenkrankheiten. I. Die Immunitätsverhältnisse des Gehirns und des Serums in ihren Beziehungen zueinander bei experimenteller Recurrens. [**The Immunity Relations of the Brain and Serum in Experimental Relapsing Fever.**]—*Klin. Woch.* 1925. Oct. 15. Vol. 4. No. 42. pp. 1995–1997. [3 refs.]

ii. —— & SCHAUDER (H.). II. Zur Frage der Spirochätenpersistenz im Zentralnervensystem bei experimenteller Recurrens. [**Persistence of Spirochaetes in the Central Nervous System in Experimental Relapsing Fever.**]—*Ibid.* Nov. 26. Vol. 4. No. 48. pp. 2288–2289. [2 refs.]

i. The authors have investigated the relation of the spirochaetes of the brain to the immune substances of the blood of rats infected with the spirochaete of relapsing fever. For some time after an infection has disappeared from the blood and the animals are no longer inoculable spirochaetes persist in the brain substance. The brain substance of such animals has been shown to contain no immune bodies, though they are present in the blood. Furthermore, the spirochaetes of the brain are susceptible to the immune bodies in the blood of the same animal.

ii. The persistence of spirochaetes in the brain and bone marrow of recovered and immune animals is a regular phenomenon. They can be recovered from the brain medulla more often that from the cortex. As the latter has a better blood supply it probably contains more immune substance than the medulla.

C. M. W.

KRITSCHEWSKY (J. L.) & FRIEDE (K. A.). Die Chemoprophylaxis des Rückfallfiebers und der Trypanosomenerkrankungen durch das Stovarsolan. [**Chemical Prophylaxis of Relapsing Fever and Trypanosomiasis by Stovarsolan.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 5. pp. 707–753. [27 refs.]; also in *Arb. a.d. Microbiol. Inst. des Volksunterrichtskomissariats.* Moscow. 1925. Vol. 1. French summary p. 348. [In Russian pp. 207–347. Refs. in footnotes.]

Working with relapsing fever spirochaetes and *Trypanosoma equiperdum*, the authors have shown that Stovarsolan, the Russian equivalent of Stovarsol, acts as a prophylactic against infection in animals, and as a therapeutic agent when given after the injection of the virus and before organisms appear in the blood. The prophylactic action was tested by administering the drug either by the mouth or by subcutaneous injection, and after an interval inoculating the virus. The therapeutic action was tested by inoculating the virus

and administering the drug after an interval. In each case it is necessary that the interval be not longer than 3 to 8 hours. That the animals had actually been cured by the drug was proved by their susceptibility to inoculation at a later date. The animals which had recovered without treatment could not be reinfected. The papers are very long and involved, and contain an enormous number of figures set out in 40 tables in the Russian paper and 13 in the German version.

C. M. W.

Kritschewsky (J. L.) & Ljass (M. A.). Zur Frage ueber die Verwirklichung der "Therapia sterilisans" des experimentellen Rückfallfiebers durch die Anwendung von therapeutischen und hypertoxischen Dosen von Salvarsan. [**The Employment of Hypertoxic Doses of Salvarsan to obtain Therapia sterilisans in Experimental Relapsing Fever.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Sept. 1. Vol. 29. No. 9. pp. 422–435. [14 refs.]

The so-called therapeutic dose of salvarsan fails to eradicate from all mice infections due to *S. duttoni*. To bring this about it is necessary to inject hypertoxic doses of the drug. The possibility of producing a sterilization of an infection depends in all its stages on the host individuality.

C. M. W.

Silverston (J. D.). **Relapsing Fever Therapy in General Paralysis: Clinical Notes on a Case of Paresis treated with African Tick Fever.** —*Jl. Mental Science.* 1924. Jan. Vol. 70. No. 288. pp. 89–92.

This paper gives the history of a case of general paralysis which was treated with a superimposed infection of *Spirochaeta duttoni* brought about by the bites of *Ornithodorus moubata*. The incubation period was four days. The first attack lasted six days and was associated on the fifth and sixth days with an erythematous eruption which covered the whole body except the face. After an apyrexial period of two days a relapse occurred, spirochaetes again appearing in the blood. They persisted for two days and then disappeared, the patient having no further attacks though no treatment was given. A second patient inoculated with 10 cc. of blood taken during the relapse did not become infected. The infection of the first case appeared to have no influence on the general paralysis.

C. M. W.

de Mello (Froilano). **Some Remarks upon *Spirochaeta bronchialis* Castellani, and Bronchial Spirochaetosis.**—*Jl. Trop. Med. & Hyg.* 1925. July 1. Vol. 28. No. 13. pp. 237–242. [12 refs.]

The paper is a lengthy dissertation on the value of the author's method of differentiating spirochaetes, especially those of the mouth and bronchi. It is claimed that the index obtained by dividing the sum of the lengths of 100 spirochaetes by the total number of coils together with the average length and breadth will give data sufficient for the differentiation of species. It is concluded that *S. bronchialis* is a good species which is distinct from the spirochaetes of the mouth and Vincent's angina. The whole argument depends on a number of assumptions the failure of any one of which would invalidate the conclusions arrived at by the author.

C. M. W.

Cadbury (W. W.), Jeu (L. N.) & Harvey (J. L.). **Bronchial Spirochetosis in Canton.**—*China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 408–412. [8 refs.]

The paper describes four cases of pulmonary disease in Cantonese in the sputa of which spirochaetes could be found, but no tubercle bacilli. X-ray photographs of three of the patients showed evidence of pulmonary tuberculosis in two and this was confirmed by tuberculin test. In the third case the photograph showed nothing abnormal. To the two tubercular patients neoarsphenamine was given. It brought about marked improvement and disappearance of spirochaetes from the sputum. A similar result was obtained in the third case with sodium cacodylate.

C. M. W.

Schijveschuurder (W.). Een geval van Spirochaetosis bronchialis **Case of Bronchial Spirochaetosis.**—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1925. Vol. 65. No. 3. pp. 277–279. With 1 plate.

A case of acute bronchial spirochaetosis in a native of Boeton (Dutch East Indies). Though there was repeated haemoptysis the patient's condition was good, the only physical signs being a few moist râles at the back. The sputum contained numerous spirochaetes and fusiform bacilli. Three injections of neosalvarsan effected a cure.

W. J. Bais.

Kline (B. S.) & Berger (S. S.). **Spirochetal Pulmonary Gangrene treated with Arsphenamins.**—*Jl. Amer. Med. Assoc.* 1925. Nov. 7. Vol. 85. No. 19. pp. 1452–1458. With 8 text figs. [7 refs.]

The paper describes cases of pulmonary gangrene which appear to be due to the aspiration from the mouth of spirochaetes and fusiform bacilli. It arises as a complication of any acute or chronic pulmonary condition. It is usually unrecognized owing to the attribution of the symptoms to the primary disease. It is a serious complication which is frequently fatal if left untreated. It can be suspected if in the course of any respiratory condition the sputum becomes brown and foul smelling, and if there is an increase in the severity of the existing signs and symptoms. The authors describe sixteen cases of the condition illustrating their account with temperature charts, X-ray photographs of the lungs and photographs of the spirochaetes. Five of the cases in which definite gangrenous necrosis with cavitation of the lungs was present were treated with arsphenamine which apparently prevented death and resulted in disappearance of symptoms. Five cases, which were either not treated, or treated only when moribund, terminated unfavourably. Five milder cases were promptly cured by arsphenamine. The sixteenth case left hospital after one injection of the drug. It is pointed out that the condition can be prevented by eradicating the primary oral focus of infection.

C. M. W.

Bezançon (F.) & Etchegoin (E.). **Presence of Spirochaetes in the Sputum of Tuberculous Patients.**—*Jl. Trop. Med. & Hyg.* 1925. June 15. Vol. 28. No. 12. pp. 228–230. With 3 text figs.

The authors have examined 239 samples of sputum from tuberculous patients for spirochaetes, and believe that a particular type of spirochaete occurs in the sputa of the haemoptytic type. It is not present

when haemoptysis is absent, but immediately appears when this condition supervenes. It was discovered in 26 out of 27 haemoptoic sputa together with tubercle bacilli. In the one case in which it could not be found tubercle bacilli were also absent. The following procedure was adopted for detection of the organism. A small quantity of the sputum was shaken up with about 1·5 cc. of physiological salt solution and allowed to stand for half an hour in the incubator at 29° C. The spirochaetes tend to accumulate on the surface of the liquid, from which a small drop is taken for dark-field examination or film making. The spirochaete is about 7 to 15 microns in length, with a distance of 3 microns between the spiral turns. It is said to differ morphologically from *S. dentium*, *S. bronchialis*, *S. buccalis*, and the spirochaete of Vincent's angina.

C. M. W.

Pons (R.). Vaccinothérapie antispirillaire dans les affections à association fuso-spirochétienne de la peau et des muqueuses. [**Vaccinotherapy in Affections of Skin and Mucosa due to the Fuso-Spirochaetal Association.**]—*Bull. Soc. Path. Exot.* 1925. May 13. Vol. 18. No. 5. pp. 380–383. [1 ref.]

Having obtained cultures of a saprophytic spirillum from a human mouth, the author was led to test the action of a vaccine prepared from it on various ulcerative conditions associated with the presence of spirochaetes and fusiform bacilli. After preliminary trials a vaccine was prepared with a concentration of 500,000,000 organisms per cc. It was administered on successive days, commencing with a dose of 1 cc., increased to 1·5 and then to 2 cc. In all 35 cases have been treated, of which one was a case of noma in an infant 2 years of age, 2 cases of membranous ulcerative stomatitis, one a case of alveolar dental pyorrhoea, 2 cases of chronic ulceration of the buccal cavity, and one a case of buccal gangrene. In all the cases remarkably rapid healing occurred, associated with disappearance of the fusiform bacilli and later the spirochaetes.

C. M. W.

Micheloni (Louis A.). **Spirochaetosis Riverensis.**—*Med. Jl. & Record.* 1925. May 20. pp. 593–597.

The writer of this paper believes he has discovered a new disease in Montevideo which he names Spirochaetosis riverensis. It is said to commence as gonorrhoea, and to lead to a condition of meningitis in which the eyes, ears and heart are involved. Diagnosis is made by the discovery of the spirochaete not by the physician, but by the patient himself, who is told to fix his gaze on the sky. After some special training of the eyes and encouragement from drawings of the organism he is expected to see, the patient soon detects the spirochaete swimming in the anterior chamber of his eyes.

C. M. W.

Schüffner (Wilhelm). Beitrag zur Leptospirose der Ratten. [**Leptospira Infection of the Rat.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 333–341. With 2 figs. on 1 plate. [5 refs.]

As a result of serological studies carried out with the leptospira of rats from Amsterdam, the conclusion is reached that these animals

harbour distinct races. One race corresponds with the leptospira of Weil's disease, another with an organism (*Leptospira pyrogenes*) which was isolated by Vervoort from a mild febrile disease in the Dutch East Indies [this *Bulletin*, Vol. 21, p. 262], and a third with neither of these, though it resembles the second one in some respects. It appears doubtful if rats are to be regarded as true reservoirs of the human virus. In Amsterdam there appears to be no relation between the incidence of the disease in man and the infection of rats. Two wild rats have been shown to remain infected for $1\frac{1}{2}$ and $1\frac{3}{4}$ years, so that it appears probable that the animals once infected remain so for the rest of life. In the kidneys of infected animals the leptospiras are collected together in a number of nests in the convoluted tubules, whence they escape regularly in the urine.

C. M. W.

Battistini (Telémaco). **The Immunological Relationships of the Leptospira Group of Spirochaetes.**—*Jl. Trop. Med. & Hyg.* 1925. June 1. Vol. 28. No. 11. pp. 201–202. [7 refs.]

By introducing specific sera into leptospira culture media in total concentrations of 1 20 and 1 100 it was found that the homologous organism would not grow, while others did. Three species of *Leptospira*, viz. *L. icteroides* (5 strains), *L. icterohaemorrhagiae* (3 strains) and *L. hebdomadis* (one strain) were used. The results obtained afford additional evidence of the serological distinction of the 3 species of *Leptospira*.

C. M. W.

Patay (R.). Sur l'extension aux flagellés d'un fixateur de Noguchi pour spirochètes. [**Noguchi's Fixative for Spirochaetes and Flagellates.**]—*Bull. Soc. Path. Exot.* 1925. Apr. 8. Vol. 18. No. 4. pp. 305–306. [1 ref.]

As a fixative for spirochaetes and various flagellates the author finds that recommended by Noguchi to give very good results. It is prepared as follows :—

A solution of N/15 disodium phosphate 88 parts is added to a solution of N/15 monopotassium phosphate 12 parts. Of this mixture 9 parts are added to 1 part of commercial formol. The fixation, which occupies 5 minutes, may be applied to wet or dry films. Red blood cells are destroyed so that the parasites are more clearly visible. Staining can be carried out not only with Giemsa stain, but any of the basic stains, such as gentian violet or fuchsin.

C. M. W.

i. Peters (Ludwig). Zur Recurrensbehandlung der Paralyse. [**Relapsing Fever Treatment of General Paralysis.**]—*Arch. f. Psychiatrie u. Nervenkrankht.* 1925. Apr. 26. Vol. 73. No. 5. pp. 592–599. [22 refs.]

ii. Johnson (W. B.). **Case of Relapsing Fever occurring in a Patient under Treatment with a Salvarsan-Group Drug.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. p. 177. With 1 chart in text.

iii. Ito (Mitsutatsu). [**Experimental Studies on the Influence of** *Chrysanthemum cinerariaefolium* **against the Spirochetes.**]—*Nihon Biseibutsu Gakkwai Zasshi* (*Jl. Japan Microbiol. Soc.*). 1924. July. Vol. 18. No. 9. [Summarized in *Japan Med. World.* 1925. May 15. Vol. 5. No. 5. p. 130.]

iv. Buschke & Kroó. Erwiderung auf die Arbeit von J. Tomioka: "Experimenteller Beitrag zur Frage der Immunität bei Recurrens und ihrer Beeinflussung durch die Salvarsantherapie" in Bd. 92. Nr. 1 2 des Centralbl. f. Bakt etc. [**Reply to Tomioka's Paper "Observations on Immunity in Relapsing Fever and its Influence on Salvarsan Treatment."**]—*Cent. f. Bakt.* I. Abt. Orig. 1925. June 8. Vol. 95. No. 2/4. pp. 188–191.

Manteufel (P.). Bemerkungen zu der Erwiderung von Buschke und Kroó auf die Arbeit von Tomioka zur Frage der Immunität bei Recurrens usw. in Bd. 95, S. 188 d. Zeitschr. [**Remarks on Buschke and Kroó's Reply to Tomioka's Paper.**]—*Ibid.* Aug. 15. Vol. 96. No. 1. pp. 12–17. [1 ref.]

v. Izeki (Kaneoki). [**On So-called "Yellow Disease" prevailing in the Shangtung Districts in China.**]—*Jikken Igaku Zasshi* (*Jl. Experim. Med.*). 1924. Sept. Vol. 8. No. 9. [Summarized in *Japan Medical World.* 1925. May 15. Vol. 5. No. 5. p. 134.]

vi. Mathur (Sarup Narayan) & Zutshi (K. N.). **Fungo-Spirochaetal Affections of Respiratory Passages.**—*Indian Med. Gaz.* 1925. Oct. Vol. 60. No. 10. pp. 468–469.

i. An account of the treatment of 15 cases of general paralysis with induced relapsing fever. In 10 of these cases the improvement was so marked that the patients were able to return to their occupations.

ii. A patient who was being treated for syphilis at the Kaduna Hospital in Nigeria with intravenous injections of stabilarsan developed relapsing fever.

iii. The extract of *Chrysanthemum cinerariaefolium* has marked action on the spirochaete of relapsing fever both *in vitro* and *in vivo*. In the latter case the extract was administered to animals by the intravenous route.

iv. Both these papers are controversial in nature and criticize the results obtained by Tomioka (this *Bulletin*, Vol. 22, p. 711).

v. The "yellow disease" which is prevalent in Shantung, China, is said by the author to be due to a variety of *Spirochaeta obermeieri*. Clinically, the disease appears to be allied to Weil's disease.

vi. A record of the occurrence of spirochaetes and fungi in the sputa of 8 cases of bronchial trouble.

C. M. W.

de Mello (Froilano). Spirochétose broncho pulmonaire.—*Arquivos Indo-Portugueses de Med. e. Hist. Nat.* Nova-Goa. 1925. Vol. 2. pp. 1–20. With 4 figs. on 2 plates.

RAT-BITE FEVER.

Parmanand (M. J.). **Rat-Bite Fever with Special Reference to its Aetiological Agent. II.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 609–612. [11 refs.]

An investigation of Bombay rats has shown that the organism of rat-bite fever is most commonly present in the bandicoot (*Nesokia bengalensis*). It occurred in 11 of 100 of these rats examined, and in

only 2 of 100 *Mus rattus*. Morphologically, the organism corresponds in every way with that first described by the Japanese, and has terminal flagella, though Row believed that the organism isolated by him from cases of the disease in Bombay was a different species.

C. M. Wenyon.

Row (R.). **On the Rat-Bite Spirochaete.**—*Indian Med. Rec.* 1925. Aug. Vol. 45. No. 8. p. 239. [8 refs.]

The author points out that Parmanand (above), in his description of the organism of rat-bite fever of Bombay, has neglected to acknowledge the work already done by him (the author) in this city. He does not agree that the organism studied by him is identical with that of the Japanese disease.

C. M. W.

Ebert (B.) & Hesse (E.). Zur Klinik und Bakteriologie des japanischen Rattenbissfiebers (Sodoku). [**Symptomatology and Bacteriology of Sodoku.**—*Arch. f. Klin. Chirurg.* 1925. June 4. Vol. 136. No. 1. pp. 69–98. With 9 text figs.

The authors describe in considerable detail the nervous symptoms (affecting skin, eye, ear, nose) of a case of rat-bite fever seen by them in Russia. The pathological condition of excised lymphatic glands is noted, while it is claimed that from the blood a polymorphic leptothrix was cultivated. The serum of the patient gave positive reactions with this organism, though with other strains of leptothrix it was negative. The authors believe that there may be two types of rat-bite fever, the one caused by the usual spirillum, and the other by a leptothrix, or that the leptothrix occurs as a frequent secondary infection.

C. M. W.

Apert (E.), Kermorgant (Y.) & Garcin (R.). Trois nouveaux cas de sodoku observés dans la région parisienne. Parallèle entre le sodoku et la syphilis. [**Three Fresh Cases of Sodoku seen near Paris. Sodoku and Syphilis.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. July 16. Year 41. 3rd Ser. Vol. 49. No. 25. pp. 1080–1084. [1 ref.]

In giving a description of three cases of rat-bite fever in children in France the authors emphasize the resemblance of the disease to syphilis. In both there is a primary lesion followed by secondary lesions in the shape of adenitis and cutaneous eruptions. The eruption in rat-bite fever is first noted after the appearance of spirochaetes in the blood and, as illustrated by the cases described, it is localized in the head and neck. With the object of testing the action of bismuth one of the cases was treated for 3 months with injections of Quinby without any improvement taking place. It was then treated with arsenicals which, as in the other two cases, effected a cure. In a discussion following the paper Sézary suggests the administration of trivalent arsenicals (606 or 914) or pentavalent arsenicals (stovarsol, treparsol) for several days as a prophylactic after rat bites.

C. M. W.

Mooser (H.). Die Katze als Überträgerin von Sodoku. [**The Cat as Carrier of Rat-Bite Fever.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 253–260. [6 refs.]

The paper describes a case of cat-bite fever in a woman. The organism was not recovered, but the diagnosis was established by various serological tests. The serum mixed with infected blood of guineapigs rapidly immobilized the spirochaetes. A mixture of the patient's serum and infective blood incubated for an hour at 37° C. failed to produce local lesions when injected into the skin of guineapigs. When normal human serum was substituted local lesions appeared in 5–7 days. In both cases a general infection resulted. The cat responsible for the patient's illness and a dog from the same house were investigated. Though no spirochaetes could be found, the serum of both animals contained antibodies. It is concluded that both animals had suffered from the disease. It was demonstrated that two cats and one dog were susceptible to inoculation with the organism.

C. M. W.

Sangiorgi (Giuseppe). A proposito della sclerosi primitiva sperimentale del Sodoku. [**Experimental Primary Sclerosis in Sodoku.**]—*Pathologica.* 1925. May 15. Vol. 17. No. 396. p. 274.

Referring to an observation made by Adachi and Matsumoto that the organism of rat-bite fever inoculated into the subcutaneous tissue of the scrotum of rabbits gives rise to a sclerosis, the author points out that the organism in many respects resembles a *Treponema* but that certain differences justify its inclusion in a distinct genus *Treponemella*, as already suggested by him (this *Bulletin*, Vol. 20, p. 140).

C. M. W.

Salimbeni (A. T.), Kermorgant (Y.) & Garcin (R.). Sur l'existence de formes filtrables du parasite du sodoku dans la rate des souris expérimentalement infectées. [**Filterable Forms of the Sodoku Parasite in the Spleen of Experimentally-infected Mice.**]—*C. R. Soc. Biol.* 1925. July 3. Vol. 93. No. 23. pp. 229–230.

Emulsions of the spleen of mice infected with the organism of rat-bite fever were filtered through Chamberland L 3 filters at a pressure of 40 cm. of mercury after the addition of a culture of the coccobacillus of chicken cholera. The filtrate, which was free from the added organism, was injected to mice in a dose of 5 cc. and gave rise to a typical spirillar infection.

C. M. W.

Salimbeni (A. T.), Kermorgant (Y.) & Garcin (R.). L'infection expérimentale du cobaye, provoquée par le parasite du sodoku. [**Experimental Sodoku Infection in the Guineapig.**]—*C. R. Soc. Biol.* 1925. July 10. Vol. 93. No. 24. pp. 335–337.

Experimental rat-bite fever in guineapigs varies with the age of the animals. Young guineapigs acquire an acute infection which is fatal in 12–15 days. If adult animals are inoculated with small doses the disease is a very chronic one of 2 or 3 months' duration.

Some of the animals show marked skin lesions and oedemas in which numerous spirilla occur. Others do not suffer in this way and appear to remain in good health. In both cases spirilla appear in the blood from time to time. The chronic form of infection in these animals is very similar to the disease in man.

C. M. W.

Mooser (H.). **Experimental Studies with a Spiral Organism found in a Wild Rat and Identical with the Organism causing Rat-Bite Fever. Second Paper.**—*Jl. Experim. Med.* 1925. Oct. 1. Vol. 42. No. 4. pp. 539–559. With 6 figs. on 2 plates. [15 refs.]

The observations recorded in this paper are a continuation of those previously described (this *Bulletin*, Vol. 21, p. 742). The organism obtained from a wild rat in Mexico City and one isolated from a case of rat-bite fever have been studied in rabbits, which are easily inoculated with both. Three to 5 days after subcutaneous inoculation a local lesion in the shape of oedema, induration and inflammation appears. About 8 days later oedematous swellings and inflammation appear on the head and genitals. The organism could always be found quite easily by dark-field examination in serum aspirated from the primary lesions, but could not be found in the peripheral blood or in serum from the secondary skin lesions by this method. It was demonstrated, however, that the blood of rabbits was infective to guineapigs, as also portions of the tissues, including those of the secondary skin lesions taken from rabbits whose blood had ceased to be infective. It was proved that the infection was transmissible from rabbit to rabbit by coitus. Protective bodies appear in the blood of rabbits, and these are able to protect animals against inoculation. The experiments demonstrate that the naturally occurring rat strain and that derived from the case of rat-bite fever are identical.

C. M. W.

Taoka (Kiyowo) & Tanabe (Misao). [**Serological Studies on Experimental Protozoan Diseases. Communication II. Serological Studies of Experimental Rat-Bite Disease.**]—*Saikingaku Zasshi* (*Jl. of Bact.*). 1924. Dec. No. 346. [Summarized in *Japan Med. World.* 1925. May 15. Vol. 5. No. 5. p. 133.]

The blood of rabbits infected with trypanosomes acquires the property of giving a positive Wassermann and precipitin reaction. The blood of the normal rabbit may give a positive Wassermann reaction, but never the other. In the case of rat-bite fever two substances appear in the serum. One resembles the luetic reactive substance, while the other is a haemolysin.

C. M. W.

i. Cavina-Pratesi (Giovanni). Altri casi di Sodoku in provincia di Brescia. [**Further Cases of Sodoku in the Province of Brescia.**]—*Riforma Med.* 1925. May 4. Vol. 41. No. 18. pp. 429–430.

ii. Franchini (G.) & Ghetti (G.). Contributo allo studio del Sodoku. **Sodoku.**]—*Pathologica.* 1925. June 1. Vol. 17. No. 397. pp. 295–298. With 2 charts & 4 figs. in text.

iii. Thorp (Eustace). **Rat-Bite Fever in an Infant.** [Memoranda.]—*Brit. Med. Jl.* 1925. Aug. 8. pp. 255–256.

iv. Winkelbauer (Adolf). Sodoku in Oesterreich. [**Sodoku in Austria.**] —*Wien. Klin. Woch.* 1925. Sept. 10. Vol. 38. No. 37. pp. 1003–1005. With 4 charts in text.

v. Blum (Paul) & Clément (Robert). A propos de la réaction de Bordet-Wassermann dans le Sodoku. [**The Bordet-Wassermann Reaction in Sodoku.**]—*Progrès Méd.* 1925. Mar. 14. No. 11. pp. 390–395. [3 refs.]

vi. Salimbeni (A. T.), Kermorgant (Y.) & Garcin (R.). La transmission héréditaire du sodoku chez le cobaye. [**Hereditary Transmission of Sodoku in the Guineapig.**]—*C.R. Soc. Biol.* 1925. July 10. Vol. 93. No. 24. p. 337.

i. A description of two cases of rat-bite fever in Italy.

ii. Description of a case of rat-bite fever in Bologna diagnosed by the discovery of the specific organism in the blood and in inoculated guineapigs.

iii. A record of an infant who suffered from intermittent fever, scarlatiniform rash and abscess formation after a rat bite in Sunderland. A diagnosis of rat-bite fever was made.

iv. A case of rat-bite fever in a boy 14 years of age in Austria.

v. The authors find that cases of rat-bite fever in which syphilis can be excluded may give a positive Wassermann reaction.

vi. The authors have shown that guineapigs born of parents infected with the spirillum of rat-bite fever may be themselves infected at birth.

C. M. W.

Gussew (V.). Ein Fall von Rattenbisskrankheit.—*Deut. Med. Woch.* 1925. Aug. 21. Vol. 51. No. 34. p. 1403. [3 refs.]

di Loreto (Ottavio). Su di un caso di sodoku. (Sokoshio—Rat-Bite Fever—Setticemia eruttiva da morso di topo.)—*Ann. di Med. Nav. e Colon.* 1925. Sept.–Oct. Year 31. Vol. 2. No. 3–4. pp. 183–190. With 1 plate. [18 refs.]

Takaki (I.). Ueber das Vorkommen der Erreger der Weilschen Krankheit (*Spirochaeta icterohaemorrhagica*) und der Rattenbisskrankheit (*Spir. morsus muris*) bei Wiener Ratten.—*Wien. Klin. Woch.* 1925. Nov. 12. Vol. 38. No. 46. pp. 1231–1232.

INFECTIOUS JAUNDICE.

Hindle (Edward) & Brown (H. C.). **Spirochaetal Jaundice in Great Britain.**—*Lancet.* 1925. Aug. 22. pp. 372–373. [10 refs.]

From the observations recorded in this paper, it seems probable that many cases of slight jaundice, especially in children, which are usually diagnosed influenza followed by jaundice are in reality due to leptospira infection. Two cases are described—that of a boy age 12, and his sister age 8. Fifteen days after his return from school in April the boy became ill with vomiting, slight fever and other symptoms. During the second week jaundice was well marked, and the urine contained albumin and red blood corpuscles. It was discovered that 14 cases of a similar kind had occurred amongst the boys from the school. The sister of the boy became ill exactly thirty days after his illness commenced. The symptoms in this case were similar, except that vomiting did not occur. Careful daily examinations of the urine were made for leptospira, and these were discovered on the ninth day

in considerable numbers. Guineapig inoculations were made from the centrifuged deposit of the urine without definite result. No inoculation was made, however, on the ninth day when leptospira were found.

C. M. Wenyon.

Hindle (Edward). **Leptospira in London Waters.**—*Brit. Med. Jl.* 1925. July 11. pp. 57–59. [12 refs.]

The author has found that leptospira are present in London tap water, and several other natural waters, including that of the Thames. A chance observation led him to the discovery of a simple method of demonstrating the presence of the organisms. A Petri dish in which faeces diluted with tap water had been kept for some time was found to contain large numbers of leptospira. It was finally shown that similar cultures could be obtained by adding to water in a Petri dish a small quantity of sterilized emulsion of faeces and incubating for about 10 days at 25° to 30° C. The organisms will pass through an L3 Chamberland filter in sufficient numbers to be detected microscopically. With an L5 filter they could not be detected in the filtrate, but appeared again in numbers when the filtrate had been incubated for 10 days in a Petri dish. The author believes that these experiments support the view that some other and smaller stage of the organism exists. It was not found possible to obtain a pure culture of the leptospira; nevertheless, guineapigs were inoculated with the impure cultures. Though the animals gave a febrile reaction, and suffered from rectal haemorrhage, and on post-mortem showed slight jaundice and one or two haemorrhagic spots, the results obtained were inconclusive as regards the possible pathogenicity of the water leptospira. The organism was agglutinated by a 1 in 40 dilution of an antiserum prepared from a pathogenic strain.

C. M. W.

Burgess (A. S.). **Leptospirae in Tap Water.**—*Proc. Roy. Soc. Med.* (Sect. Trop. Dis. & Parasit.). 1925. June. Vol. 18. No. 8. pp. 57–58. With 1 text fig.

A record of the occurrence of leptospira in the tap water of Accra, Gold Coast. The organism corresponded morphologically with those of yellow fever and Weil's disease.

C. M. W.

Zeri (Agenore). Sulla spirochetosi ittero-emorragica. [**Icterohaemorrhagic Spirochaetosis.**]—*Riforma Med.* 1925. Apr. 27. Vol. 41. No. 17. pp. 396–397.

As a rapid means of diagnosing Weil's disease the author advocates the injection of about 5 cc. of the urine of the patient into the peritoneal cavity of a guineapig. If blood is withdrawn from the heart 24 to 48 hours later large numbers of leptospira may be found by dark ground examination. [Are these really leptospira and not filaments?]

C. M. W.

Pettit (Auguste). Apparition d'agglutinines dans le liquide céphalo-rachidien au cours de la spirochétose ictérohémorrhagique. [**Agglutinins in the Cerebrospinal Fluid in Weil's Disease.**]—*Bull. Acad. Méd.* 1925. Feb. 17. 3rd Ser. Year 89. Vol. 93. No. 7. pp. 197–198.

Examining the cerebrospinal fluid of 3 cases of Weil's disease the author has been able to demonstrate that antibodies are present in sufficient amount to produce agglutination of the specific organism.

C. M. W.

Delamare (G.) & Achitouv. Graphiques des indices de courbure partiels de *Spirochaeta icterohaemorrhagiae*. [**Graphs of Indices of Curvature of** *S. icterohaemorrhagiae*.]—*C. R. Soc. Biol.* 1925. Aug. 14. Vol. 93. No. 27. pp. 567–569. With 3 text figs.

The variations in the curvature of *S. icterohaemorrhagiae* and *S. recurrentis* var. *venezuelensis* are shown on charts which indicate that the former is distinctly polymorphic as compared with the latter, in which the polymorphism is at a minimum.

C. M. W.

Adachi (Kiyohisa) & Hidaka (Hiroyuki). **On the Pure Culture of** *Spirochaeta Icterohemorrhagica*.]—*Tokyo Iji-Shinshi* (*Tokyo Med. News*). 1925. May. No. 2420. [Summarized in *Japan Med. World*. 1925. July 15. Vol. 5. No. 7. p. 184.]

The following medium is recommended for the cultivation of *Leptospira icterohaemorrhagiae*. To 1,000 cc. of tap water are added 0·5 gm. of calcium chloride, 20 cc. of citrated plasma, 50 cc. of inactivated serum, and several cc. of guineapig's blood. After inoculation the proteins gradually form a flocculate which floats in a transparent liquid. The organisms are most numerous in the flocculate.

C. M. W.

YELLOW FEVER.

Mulier (Henry R.) & Blaisdell (C. Byron). **Studies of the Yellow Fever Epidemic in Salvador, C.A., in 1924.**—*Jl. Trop. Med. & Hyg.* 1925. Aug. 1. Vol. 28. No. 15. pp. 277–284. With 2 text figs. [6 refs.]

During the period July to October, 1924, an epidemic of yellow fever occurred in San Salvador in which 56 recorded cases occurred. The investigations detailed in this paper refer to serological and pathological investigations conducted after the epidemic had subsided. Of 19 persons who had recovered from the disease the sera from 16 gave positive Pfeiffer's test with *Leptospira icteroides*. Of 5 persons from the Western part of the republic who had suffered from a suspicious disease the sera of two gave a positive test. The sera of 15 soldiers, 15 sanitary inspectors and 22 children from 6 to 8 years of age were negative. None of these had had the disease, though it was thought possible that they might have suffered in a mild and unrecognized degree. The negative test did not support this view. The test applied to vaccinated persons showed that the lytic substance induced by vaccination might still be active after the lapse of 5 months. The histo-pathology of 6 cases was investigated. In the liver zonal necrosis was present and more rarely focal necrosis together with marked fatty degeneration. Associated with these changes was round-celled infiltration and a milder polynuclear infiltration. Mitosis and haemorrhages were frequently found. The kidneys showed evidence of acute tubular nephritis. Lime casts were present in 2 of the cases; it is suggested that they are formed in some but not all types of nephritis associated with yellow fever. They occur especially when desquamation of the tubular cells is a feature.

C. M. Wenyon.

LeBlanc (Thomas J.). **Studies of Yellow Fever in Vera Cruz in 1920-1921.**—*Jl. Trop. Med. & Hyg.* 1925. May 1. Vol. 28. No. 9. pp. 169–178. With 15 charts in text. [7 refs.]

During 1920 7 cases of yellow fever were studied in Vera Cruz from the point of view of isolation of leptospira. The disease was successfully transmitted to guineapigs from one of these cases and after the third passage *L. icteroides* was recovered in pure culture. The organism produced in guineapigs all the typical symptoms of experimental yellow fever in these animals. Of 7 cases of the disease treated with serum all recovered except one which was not treated until the end of the third day. Of 197 untreated cases 85 died. Amongst 748 non-immunes who were vaccinated there occurred two cases of suspicious mild yellow fever. Though it is thought that the 748 vaccinated individuals represented the greater part of the non-immunes of Vera Cruz there occurred 199 cases of yellow fever amongst the others.

C. M. W.

Leger (Marcel). Épidémiologie de la fièvre jaune dans les colonies de l'Ouest Africain Français. [**Epidemiology of Yellow Fever in French West Africa.**]—*Bull. Office Internat. d'Hyg. Publique.* 1925. July. Vol. 17. No. 7. pp. 727–739. [32 refs.]

The paper gives an historical account of the outbreaks of yellow fever which have occurred in the French possessions of W. Africa

since the first recorded epidemic in 1763. In Senegal the last outbreak occurred in 1911–1912. No cases have been reported from the Ivory Coast or Sudan since 1922, while the last cases were noted from Dahomey in 1924. The disease has never been recorded from Mauritania, Haute Volta, Nigeria, or Gabon. The author points out that, although the disease is no longer the nightmare it formerly was, there is still room for improvement in the regulations to render the campaign against it more efficacious. The results of declaration are so annoying that countries hesitate to report sporadic cases.

C. M. W.

Noguchi (Hideyo). **Yellow Fever Research, 1918-1924 : a Summary.**—*Jl. Trop. Med. & Hyg.* 1925. May 15. Vol. 28. No. 10. pp. 185–193. [54 refs.]

This paper gives a summary of the work which has been done by the author on the etiology of yellow fever with special reference to *Leptospira icteroides*. Most of the information has already been published, but it is very conveniently collected together here. It shows that the various strains of *L. icteroides* which have been isolated from yellow fever cases are identical, and that they differ serologically from *L. icterohaemorrhagiae* and *L. hebdomadis*. It is now pointed out that these 3 organisms not only differ from one another serologically, but also morphologically. To arrive at this conclusion they were compared under identical cultural conditions. The results, which were obtained in co-operation with Dr. Battistini, are as follows :—

L. icteroides is shorter (4–14 microns) and thinner (0·2 microns) than *L. icterohaemorrhagiae*. The elementary spirals are less closely set. The shorter forms assume a semi-oval circle, the longer specimens show greater flexibility, doubling up at any angle. All rotate swiftly with some lateral vibratory movements.

L. icterohaemorrhagiae is considerably longer than *L. icteroides* (8–24 microns), usually more uniform in length and heavier in aspect. The elementary spirals are more closely set, although in very long specimens the spirals are somewhat looser. They have the well-known hooked ends and straight bodies and rotate swiftly and gracefully without lateral vibration.

L. hebdomadis averages slightly longer than *L. icterohaemorrhagiae* and the elementary spirals are almost geometrically equidistant and distinct. The organisms rotate swiftly and evenly without relaxation of the elementary spirals and without bending the ends into a hook, the body being almost a straight line in living forms. Killed forms have the characteristic hooked ends of leptospira. Occasionally one observes living organisms showing a small hook at one end, but they soon stretch out with change of movement. There is no difficulty in distinguishing this species from the other two.

Stained films, if properly prepared, can also be used for differential purposes. The best results are obtained by fixing the culture organisms in buffered formalin and staining the dried, thin films with a saturated alcoholic solution of basic fuchsin or gentian violet for a few seconds, or with Giemsa solution (1 in 20 distilled water) for 2 hours (see paper by Patay above). Osmic acid fixation of the wet film, followed by staining with Giemsa solution also gives good results. The thin, delicate, rather short hooked forms of *L. icteroides* can be distinguished from the somewhat heavier and longer *L. icterohaemorrhagiae* with

terminal hooks and the rather straight and coarser *L. hebdomadis*. For purposes of comparison it is essential to use cultures grown under identical conditions and stained in the same dye solution.

As regards the experimental transmission of *L. icteroides* by the yellow fever mosquito the author mentions his own successful experiments and states that IGLESIAS, head of the Vera Cruz yellow fever laboratories, has also succeeded. Two guineapigs, exposed to the bites of mosquitoes fed 33 and 31 days before on infected guineapigs, developed symptoms suggestive of yellow fever and in the blood of a guineapig subinoculated from one of the two on which the mosquitoes had fed leptospira were found.

The paper also reviews the results of the use of the vaccine and serum in the prevention and cure of yellow fever. The value of these, first proved to be efficacious in animal experiments, has been substantiated by the results of vaccination and serum treatment of human beings.

It is concluded that the evidence summarized in the paper appears to warrant the conclusion that *L. icteroides* is the cause of yellow fever.

C. M. W.

HANSON (Henry) & DUNN (Lawrence H.). **The Use of Fish in the Control of Yellow Fever in Peru.**—*Milit. Surgeon.* 1925. Sept. Vol. 57. No. 3. pp. 232–241.

This is a most interesting paper which describes the experiment carried out in Peru during 1921 and 1922 with fish as a means of controlling the breeding of *Aëdes aegypti* (*Stegomyia fasciata*). After a number of preliminary observations had been made it was found that the local "life" (*Pygidium punctulatum piurae* E.) was the most satisfactory fish. They are voracious larvae and pupae eaters, and are so hardy that they will survive crowding in the pails and cans necessary for transport purposes. They rapidly adapted themselves to life in containers in which with care they would live for a long time. During the day they live at the bottom and come to the surface only at night to feed. During the period February, 1921, to May, 1922, the total number of house visits was 1,111,527, and the number of fish distributed was 857,561, of which more than 80 per cent. were lifes. For containers of ordinary size 2 or 3 fish were sufficient, while 4 to 6 were required for tanks, wells or large cisterns. The results obtained from the use of these fish are described as excellent and the method as one which was a great improvement over the earlier practice of throwing out or filtering the water.

C. M. W.

HOFFMANN (W. H.). La Anatomía Patológica de la Fiebre Amarilla.—*Rev. Méd. de Yucatan.* 1925. Apr. Vol. 13. No. 6. pp. 141–147. [See this *Bulletin*, Vol. 22, p. 189.]

——. Die Aetiologie des Gelbfiebers.—*Seuchenbekämpfung.* Vienna. 1925. Vol. 2. No. 6. pp. 279–283.

MALARIA.

ROME. **Record of the Proceedings of the First International Malaria Congress held in Rome, October 3rd to 6th, 1925.**—54 pp. [Mimeographed Report.]

Presided over by Senator MARCHIAFAVA, the Congress was opened by H.E. Benito Mussolini, delegates having been welcomed in the name of H.M. the King of Italy by Senator Cremonese. It then proceeded to the consideration of its subject in six sections :—

I. *Biology of malaria parasites.*—Professor MARCHOUX, admitting that there remained unillumined spots, ranged himself on the side of the plurality of species of malaria parasites by reason of the difference in zygotes and time of evolution, identity of type when transmitted by injection or mosquito (now repeated thousands of times), specificity of cultures, and, he added, in that only in tertian malaria does splenomegaly occur ; which last observation was not accepted by Professor PITTALUGA of Madrid. MÜHLENS pointed to 70 transmissions of benign tertian parasites followed through all seasons without change, and BRUMPT to DARLING'S experiments of deliberate superimposition of one infection upon another already existing. SWELLENGREBEL instanced a presumed mixed infection from which *A. ludlowi* transmitted only subtertian and *A. sinensis* only tertian malaria. Sadi DE BUEN noted that in Spain control had in one region almost eliminated quartan malaria, had lessened subtertian, and affected tertian but little.

II. *Inoculation fever.*—MARIE sums up the effects of malaria on general paralysis thus : " While general paralysis is not cured by this form of therapy, it is proved that stabilization takes place with such persistent remissions that readaptation to family life and to social responsibilities are possible." In other forms of cerebrospinal syphilis it would seem as if malaria therapy acts as a mordant for the specific medication employed. JAMES indicated the objection of relatives to direct inoculation of blood from paralytics, the institution of stocks of infected mosquitoes, and the observation that the observed results in over a hundred cases were superior to those of direct inoculation. Regarding " parthenogenesis," PONTANO having reverted to GRASSI'S theory that cycles of pathogenesis of gametes caused relapses, PITTALUGA pointed out his own apparently forgotten work of 1903 on " Parthenogenesis of macrogametes in Laverania," indicated his growing doubts, and his present conclusion that no case had been made out for this phenomenon and that PONTANO'S work (as already suggested in this *Bulletin*, Vol. 20, p. 774) was less convincing than his own. Victor SCHILLING'S investigations into the blood picture of disease have lead him to recognize a nonspecific sequence, viz. : 1. A prodromal characterless phase. 2. A phase of combat (neutrophil). 3. A phase of weakening defence or of victory (mononuclear). 4. Healing (lymphocytosis-eosinophilia). In malaria the phases are rapid and tend to overlap, the usual blood-picture being of the third phase.

III. *Anopheles and malaria.*—It seemed to be the general feeling that *Gambusia*, or in Palestine, *Tylapia*, species would keep down larvae if sufficient numbers could be maintained. Paris green, in addition to its ordinary use with 99 per cent. of dust, might be, as BARBER advised, mixed with refuse oil which collects particularly round vegetation. The importance, for infection, of the house, and

of indoor as opposed to outdoor meteorological conditions, was stressed by many, and JAMES pointed out that BRUMPT's experience of acquisition of malaria in tents (*vide infra*, p. 134) did not contradict this, since a "dwelling" included any shelter. SWELLENGREBEL indicated that in spite of drainage and reclamation Holland is to-day one of the richest of anopheline breeding grounds.

IV. *Propaganda and statistics.*—At Upsala, Sweden, two cases of malaria have been attributed to *A. maculipennis* infected from therapeutically-infected persons; spring outbreaks are in Sweden [as in Holland] attributed to autumnal infection, and the mosquito is held to prefer the blood of beasts to that of man. In Jugo-Slavia, too, IVANIK finds that specific precipitin reactions show that more anopheles have fed on cattle than on man, even when captured in human dwellings.

V. *The alkaloids of cinchona and malarial therapy.*—The most significant feature emerging from the discussion was the effort being made to discover in what part of the quinine molecule lies its therapeutic effectiveness, and to produce by synthesis some body which shall equal in value the cinchona alkaloids. CUCA held quinetin to be as effective as quinine.

VI. *The work of the Malaria Commission of the League of Nations.*—In discussing a paper by PITTALUGA on "Endemic Malaria in Europe to-day, and the Factors of its Variability," SWELLENGREBEL noted that in parts of the Dutch East Indies where endemic malaria is heavy, it is only children who carry gametes, while in regions previously lightly infected, but now epidemically affected, both children and adults show many gametes.

Finally the Congress adopted, among other resolutions, one by H.E. Dr. Fernando PEREZ, Argentine Minister in Italy, that a Permanent International Malarial Institute should be created in Rome with scientific and financial help of all nations; and another by Dr. Massimo SELLA that the Health Commission of the League of Nations should further aid the establishment of intimate collaboration between chemists, pharmacologists and clinicians for the systematic examination of all chemical substances likely to be actively effective against malaria.

Clayton Lane.

BLACKLOCK (D. B.) & GORDON (R. M.). **Malaria Infection as it occurs in Late Pregnancy; its Relationship to Labour and Early Infancy.**—*Ann. Trop. Med. & Parasit.* 1925. Sept. 30. Vol. 19. No. 3. pp. 327–363. With 2 charts, 3 text figs. and 4 coloured figs. on 1 plate. [12 refs.]

With the work already reported (this *Bulletin*, Vol. 22, p. 806) the period under consideration covers one year. Peripheral blood films disclosed infections as follows: Of 173 parturient women of Freetown, Sierra Leone, 71 examined by thick film, 9 showed *P. falciparum*, and three more pigmented leucocytes; of 43 non-parturient women, all examined by thick film, 3 showed infections, one by *P. vivax*, and 2 by *P. falciparum*, of which one film disclosed crescents; of 150 adult males examined by thick film, 3 showed trophozoites of *P. falciparum*; of 809 children, all examined by thin, and 100 also by thick film, 169, or 20·9 per cent., showed malaria parasites comprising all three species, 159, or 19 per cent., harbouring *P. falciparum*, of which 23, or 14·9 per cent., contained crescents.

On the other hand, of 155 placentas of the 173 parturient women, 59 showed *P. falciparum*, that is, 38 per cent. Over 50 per cent. of the infections occurred in May, June and July. Yet, notwithstanding prolonged examination, crescents were never found in placental smears. Although on section the villous spaces contained abundant parasites in infected cases, no parasites were ever found in the vessels of the villi, or, indeed, anywhere on the foetal side of the syncitiotrophoblast layer—none in the umbilical cord, none in the infant's circulation or organs.

Although the child was never found infected after death, the mother's infection must nevertheless handicap it, for, of 51 children born alive with an infected placenta, 25·5 per cent. died within 7 days; while, of 93 living children born with placenta uninfected, only 5·4 per cent. died within that period. Again, of binovular twins, one had anaemia of the placenta and of the first 6 inches of the cord, one parasite to 15 placental fields and 30 per cent. of them sporulating, evidence of great destruction of erythrocytes in the anaemic areas, and died within 15 hours; the other had a macroscopically normal placenta and cord, one parasite to 25 placental fields with none sporulating, no evidence of destruction of erythrocytes, and lived over the 7 days during which the mother remained in hospital. While, then, no parasites were found in either child, there was evidence of extensive destruction of erythrocytes in one placenta, caused, it is suggested, by a toxin liberated during sporulation. All the three children, in whose organs pigment was found, had died in utero, and all showed placental appearances resembling those of the first binovular twin. The writers feel compelled to leave open the question as to what this pigment is.

The original will repay detailed consultation.

C. L.

Kenrick (W. H.). **Report upon Malaria in the Central Provinces, 1912-1913.**—191 pp. With 14 maps & 12 charts. 1914. Nagpur: Govt. Press.

This report has but recently come to notice. The extensive investigation covered 95,577 children, perhaps the largest number ever examined in one area. Malaria in relation to rice cultivation is specially considered. By examination of 30,000 children the rice-producing area in question is divided into three sanitary categories. (1) A healthy one comprising nearly the whole of the open plains country with a spleen rate among 12,384 children averaging 4·3. (2) Endemic areas comprising the edges of the open plains and certain cultivated areas, all characterized by nearness to forest, jungle or hill, with a spleen rate among 9,075 children averaging 24·1, but ranging between 10 and 50. (3) Hyperendemic areas with jungle and hill in excess and close to villages, and a spleen rate in 8,971 children averaging 70·5. In 400 blood films all species of parasites were found, the quartan being particularly associated with considerable enlargement of the spleen in endemic areas. Intensive cultivation of rice is not then here associated with malaria.

The commonest anopheles is *A. fuliginosus*; *A. culifacies*, the next, is held probably the main malaria carrier, since it was the only species (2 of 675 dissected) which showed sporozoits in the salivary glands, and corresponded in distribution with the malarial areas even when

these comprised certain wards only of a town. Mosquitoes dissected numbered 1,052. The recommendations made entailed an expenditure of two laks of rupees annually.

C. L.

GILL (C. A.). **The Rôle of *A. rossii* as " Carrier " of Malaria. " The *Rossii* " Problem.**—*Indian Jl. Med. Res.* 1925. Apr. Vol. 12. No. 4. pp. 773–781. [8 refs.]

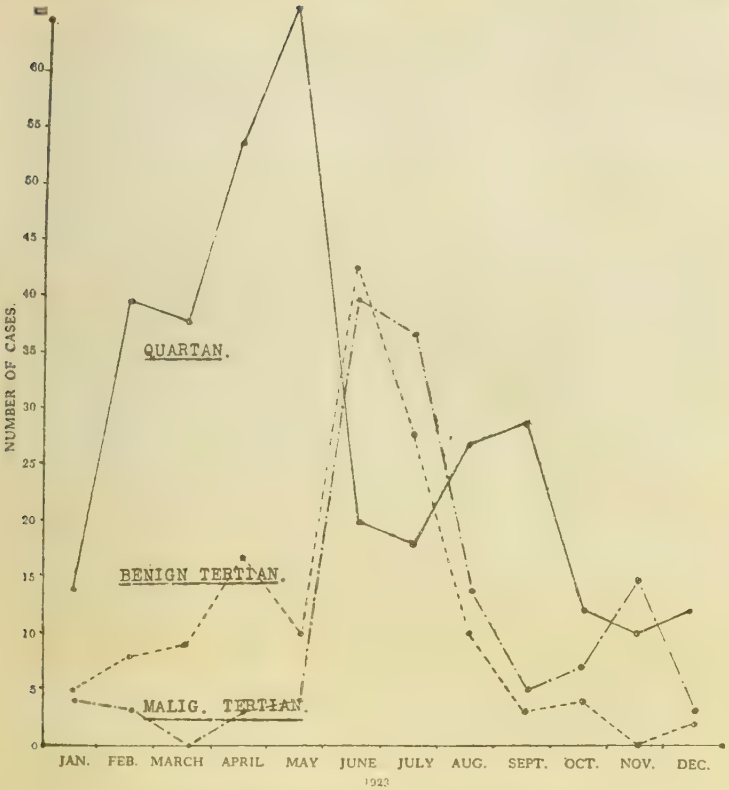
A. rossii, Giles is widely distributed throughout India, Ceylon, the Andamans, Federated Malay States, Malay Archipelago, South China and the Philippine Islands. The closely related species *A. vagus* Dönitz (*A. rossii indefinata*) is found in Bengal, Assam, Burma, F.M.S., and Malay Archipelago, while *A. ludlowi*, which so recently as 1914 was regarded by BARBER and by SCHÜFFNER as identical with *A. rossii*, is present in Burma, the Andamans, Madras, Ceylon and, predominantly, in the F.M.S. and the Malay Archipelago. Only then in North-West India is *A. rossii* found alone. Is it in nature a conveyor of malaria ? The belief of Indian malariologists is that it is not. This was tested by examining the insect in the Punjab in relation to these four postulates.—(1) Abundant presence corresponding to the malarial season. It abounds from July to November, which is precisely the main malarial season, and it so outnumbers the other species that, even if a feeble carrier, it must be harmful. (2) Capacity for experimental infection. Of 31 specimens fed on *P. vivax* blood 22 were dissected and 4 found infected. For *P. falciparum* the corresponding figures were 88, 67 and 0. *A. stephensi* used as controls were readily infected by both plasmodia. (3) Avidity for human blood. The mosquito being so readily found in stables the question of zootropism arose. It was, however, found to feed readily on man in nature, and in the laboratory ; while serological tests, shortly to be published, showed that insects caught both in stables and habitations contained human blood. (4) Suitability of environment. Observations, described as incomplete, suggest that *A. rossii* is highly susceptible to low degrees of relative humidity.

" It would appear that the observations recorded in this paper tend to increase . . . the obscurity surrounding the *rossii* problem," and it is noted that if *A. rossii* be capable of transmitting *P. vivax* only, its prevalence when *P. falciparum* is epidemic might explain its taking no part in spreading malaria in the Punjab.

C. L.

CORNER (William). **Malaria in the Kirkuk Division of Northern Mesopotamia during 1923.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. Mar. 19 & May 21. Vol. 19. Nos. 1 & 2. pp. 41–69. With 8 charts & 2 maps. [5 refs.]

The reproduced graph shows to what a predominating extent the quartan parasite is responsible for malaria at Kirkuk. The predominant rhythm was a simple quartan, less frequently quotidian, rarely double. Single and double tertian infections were about equally common. Anopheline breeding has two peaks, in May and October. The general degree of splenic enlargement is high, and the spleen rate is high both in children and adults. In both there is a surprisingly low parasite rate. It is suggested that these large spleens are the effect of the predominant quartan infection, and that its heavy incidence in the early months of the year is residual from the previous season.



Graphs showing parasitology of malaria, Kirkuk, 1923.

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene.*]

"A feature of the main malaria season was the fact that it lasted throughout the hottest and dryest month of the year, when the 8 a.m. mean temperature was about 90° F., and the mean relative humidity was below 30 per cent. Humidity, within limits, appeared to be a factor of comparatively little importance in influencing malarial prevalence."

C. L.

i. Foley (H.), Catanei (A.), Brouard (M.) & Demimuid (P.). Parasitisme et réactions morbides dans le paludisme chronique des enfants indigènes en Algérie. [**Chronic Malaria in Algerian Children.**]—*Bull. Soc. Path. Exot.* 1925. July 8. Vol. 18. No. 7. pp. 546–554. With 3 charts in text.

ii. ——, ——, —— & Leblanc (L.). Action du stovarsol dans le paludisme chronique à *Pl. vivax*, chez les enfants indigènes en Algérie. [**Stovarsol in Chronic Tertian Malaria in Algerian Children.**]—*Ibid.* pp. 554–557. With 2 charts in text. [1 ref.]

i. Among the Arab population of the Algerian coastal strip the splenic always exceeds the parasite index. All three species of malaria

parasite are found, generally singly. The commonest association is *Plasmodium vivax* and *P. malariae*. The common definitive host is *Anopheles maculipennis*. In the mixed Arab and Negroid population of the Saharan oases, exemplified by Beni Ounif, the parasite index always exceeds the splenic, in the sense that while the spleen rate in Arabs is much the same in both regions, that of negroes is lower. *Anopheles multicolor* is there the definitive host. The parasite rate was obtained by examination by two persons, over a period of one hour if necessary, of one smear and three thick preparations. By these exhaustive methods three children were examined daily for 33 days. No parasites (*P. vivax* was concerned) were found in 29 of the 99 examinations. When present, their numbers agreed generally with axillary temperature, but with certain definite exceptions. [It may be commented that the symptoms in the most marked case (fitful appetite and diarrhoea, pallor and anaemia, wasting with a protuberant and slightly ascitic belly, anisocytosis, erythroblasts, and eosinophilia) would have warranted a faecal examination for hookworm eggs.]

ii. In this, the most marked of the 3 cases cited above, aged 2 years and 8 months, stovarsol was given by mouth for 10 days in doses from 0·05 to 0·2 grammes, and repeated after a 10 days' interval. Under the same rigorous examination, described above, parasites which, in this case, had only evaded detection on one of the previous 33 days, disappeared on the third day, not to reappear. The temperature did not remain quite normal, the spleen ceased to be palpable, the blood state improved from 3,800,000 to 4,400,000 erythrocytes. Three other cases were similarly benefited.

C. L.

Charrier (H.). Remarques au sujet du paludisme à Tanger durant ces vingt dernières années. [**Malaria in Tangiers in the last 20 Years.**]—*Bull. Soc. Path. Exot.* 1925. July 8. Vol. 18. No. 7. pp. 558–569. With 3 text figs. [6 refs.]

Hospital statistics show roughly a ten-fold increase of malaria since 1905. Since the increase is disproportionate to that of other attendances, an actual increase of malaria is held to exist. With regard to Gill's figures (this *Bulletin*, Vol. 18, p. 328) of meteorological conditions favouring plasmodial development in mosquitoes, the local mean monthly temperature exceeds 16° C. from May to October inclusive, and the humidity never falls below 63 per cent. As to the prevailing wind the town is leeward of most mosquito breeding places. A chart shows that malaria incidence is proportionate to, but a month later than, the spring rains, and is inversely proportional to the autumn rains. It is pointed out that, by influence on breeding places, a deluge decreases and an even rainfall increases local malaria.

C. L.

Brumpt (E.). Etude d'une petite épidémie de paludisme contracté " en plein air " dans la région du lac Rodolphe. [**Malaria contracted in the Open Air near Lake Rudolf.**]—*Ann. Parasit. Humaine et Comparée.* 1925. Oct. Vol. 3. No. 4. pp. 370–374. With 1 map and 2 text figs.

Noting that the possibility of becoming infected in the open air is unaccepted by the League of Nations Malaria Commission, Brumpt

adduces an instance which occurred near Lake Rudolf, in Abyssinia, where his party, moving camp six days weekly, and never entering huts, but sleeping in tents, became badly infected with malaria. He notes that his own tent trapped mosquitoes, which he caught daily, not as a hygienist, but a collector. He holds that these conditions are fairly described as " en plein air."

C. L.

MacKeown (R. J.). **Indigenous Malaria.**—*Jl. Roy. Nav. Med. Serv.* 1925. Oct. Vol. 11. No. 4. pp. 302–304.

The Royal Naval Hospital, Chatham, has recently had two admissions of Air Force personnel from Eastchurch, Isle of Sheppey, Kent, suffering from microscopically established infection with *P. vivax*. One had been at Eastchurch for nearly two years, had never previously suffered from malaria, had visited Northern France persistently all his life, and had served at Constantinople from October, 1922, to September, 1923. The other had never left the United Kingdom, had been stationed at Eastchurch for 20 months, and had recently been bitten by mosquitoes. An interesting survey of the malarial history of the Isle of Grain is appended.

C. L.

Martini (E.). Ueber einige ältere deutsche Malariaepidemiekurven. [**A Study of Old German Malarial Curves.**]—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Sept. 15. Vol. 96. No. 2. pp. 101–108. With 1 chart in text. [14 refs.]

A study of malaria curves of earlier years shows that, north of the Alps, the peak of malarial incidence occurs in May or June. It is held that in hibernating anopheles malarial infection will not survive the winter, and that these peak cases have been infected in the previous summer, with an incubation period of six months and over.

C. L.

Sanarelli (G.). Lo stato attuale del problema malarico. Rilievi e proposte. [**Italy's Malarial Problem.**]—*Ann. d'Igiene.* 1925. May. Vol. 35. No. 5. pp. 417–448.

Malaria is held seriously detrimental to Italy by reducing the health and prosperity of the people, and the means used to combat it to be insufficient, whether antilarval measures, quinine distribution, screening or bonification. Our knowledge is imperfect, with many enigmas and lacunae. New means of combating malaria must be sought, as, for instance, by the creation in Italy of an Institute for the study of malaria such as the Ronald Ross Clinic for Tropical Medicine and Hygiene in London.

C. L.

Galli-Valerio (Bruno). Les causes de l'extinction de quelques foyers de malaria du nord de l'Italie et de la Suisse. [**Causes of Disappearance of certain Foci of Malaria in North Italy and Switzerland.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 126–134. [17 refs.]

To the explanation of the disappearance of malaria in these foci the writer brings an intimate knowledge of local conditions and of

happenings elsewhere. It is concluded that the main element lies in the administration of quinine, and, to a less extent, in the diminution, but not the extinction, of anopheles. With these are associated better feeding and housing. In the writer's experience the value attributed to zootropism is baseless, and leads along a false track.

C. L.

Lustig (A.). [**Malaria in Italy.**]—*Rev. Sud-Amer. de Endocrin.* 1925. Aug. 15. p. 503. [Summarized in *Brit. Med. Jl.* 1925. Oct. 31. (Epitome of Current Med. Literature.) p. 63.]

In the north and centre of Italy malaria is mild, in the south and islands, severe, particularly in Sardinia. Figures for army and railways show how much it has lessened of recent years, a decline which may be attributed to drainage of swamps, social welfare work, economic betterment among the rural population, and greater consumption of quinine.

C. L.

Falleroni (Domenico). L'anofelismo delle risaie nelle paludi Pontine, in relazione all' epidemiologia della malaria. [**Anophelism in the Rice Fields of the Pontine Marshes as affecting Malarial Epidemiology.**]—*Policlinico.* Sez. Prat. 1925. Oct. 5. Vol. 32. No. 40. pp. 1394–1396. [1 ref.]

It is held that there are in Italy two races of *Anopheles maculipennis*, the one larger, darker, more prolific, with dark eggs; the other with grey eggs, sometimes without floats. The former predominated where malaria was grave, and the latter in the rice fields, where it was mild. The races are held to influence transmitted malaria in this sense.

C. L.

Marchoux (E.) & Raynaud (Lucien). Enquête sur le paludisme en Corse. [**Malaria in Corsica.**]—*Rev. d'Hygiène.* 1925. Oct. Vol. 47. No. 10. pp. 849–880. With 1 map in text. [27 refs.]

Yet another report on the malarial state of Corsica has been originated by a request of the French Government that the League of Nations should conduct an inquiry, such as that recently effected by its agency in Italy and South-eastern Europe, and a suggestion that the personnel should include the writers. They covered the island in 10 days from 7th April onwards, Marchoux remaining a week longer. Their observations have necessarily been, in the main, anticipated. They captured, however, but two female imagines, *A. maculipennis*, and that after rigorous searches, no pupae, and many larvae, mostly still small. They conclude that the mosquito is carried on over winter by the eggs. The multitude of breeding places renders successful antilarval measures impossible. The problem must be attacked through the parasites in man. This is only possible by a whole time medical service, estimated to cost 3,000,000 francs yearly, which, it is held, would in two years render the island reasonably healthy, but could not even then be abrogated. Irrigation of the coastal plain is held essential, streams being impounded in the hills for the purpose, in order that the country may be exploited and pass from a pastoral to an agricultural state. The inhabitants must at the same time be educated to realize that their interests are not bounded by their village eerie, or even by their island.

C. L.

League of Nations. Monthly Epidemiological Report of the Health Section of the Secretariat. Geneva. 1925. Mar. 15. 4th Year. No. 3. R.E. 76. pp. 104–106.—**Malaria in Russia in 1924.**

During the first ten months of 1924 the registered cases of malaria for the whole of Russia amounted to 5,352,349, or 410 per 10,000, as against 400 in 1923, and 216 in 1913. For various regions the figure varied from 8 for the North Western to 1,092 for the Volga. Where it was epidemic in 1923 it has since decreased, and where it was slight it has increased. In the North-Western region, Trans-Caucasia, Turkestan and the Far Eastern Republic the incidence is less than in 1913, in all other districts much higher. The maximum incidence was in September in 1922, in June in 1923, and in May in 1924. In Samara, North Caucasus, and Trans-Caucasia there were, however, two peaks, in May and September. The percentage of the total infection claimed by *P. falciparum* varied from 0·5 in parts of Siberia to 56 in Trans-Caucasia and Armenia. Quartan malaria is reported only from the Volga district, Northern Caucasus and Trans-Caucasia, with its maximum incidence from September to January. *P. falciparum* has its peak in September, and *P. vivax* in May. Improved notification accounts for some of the increase, but in the country districts is so imperfect that the real incidence is estimated by some as ten times greater, the incidence for the whole of Russia lying, perhaps, about 10,000,000 annually. "The gravity of the problem is increased by the fact that famine reigns in certain districts."

C. L.

Ioff (I. G.). **On the Epidemiology of Malaria in the South East of Russia.**—*Works of the 1st All-Volgian Malarial Congress in Saratov, from 5 to 8 October*, 1924. pp. 70–72.

Recent work (Ioff 1922, Kushev & Astakhova, 1923) has called attention to the frequency of the so-called early spring (March, April, May) primary cases of tertian malaria in this Province. Investigating 1,000 cases of tertian malaria in Saratov during 1923–24, with a view to determining the time of the initial attack, the author comes to the conclusion that about one-half of all patients fell ill before the 1st of June, at which time infection through mosquitoes is quite improbable under local conditions. Anopheles wintering in dwellings were found with extreme scarcity. Therefore, the author has to admit that under the conditions prevailing in South East Russia tertian malaria has, in half of the cases, a long incubation period. In 65 cases of quartan malaria the initial attack could be strictly fixed. These occurred between July and December, with maximum in October. 210 people arrived at Saratov in August after having spent the summer in a locality highly affected with all forms of malaria (Totzki). During the winter 34 of them, or 16 per cent., developed quartan malaria; the majority of them fell ill 1–3 months after their arrival at Saratov. Since quartan malaria was observed in Saratov in but 4 per cent. of cases, the author claims that these persons had been infected at Totzki in the summer, and that this form of malaria has an incubation period of several months duration, to which is due its appearance in late autumn and winter. If this be so, mixed infections must under local conditions be numerous, a consideration which accounts for the

frequently observed change in the form of malaria in the same person during the year; there is no ground left for the unity theory.

I. Ioff.

[In forwarding this summary Dr. Ioff comments thus upon the statement by MACKENZIE (this *Bulletin*, Vol. 21, p. 291) that anopheles were found breeding in water butts within houses in winter—"this observation can relate but to a single case, as no one of many Russian investigators for the S.E. has ever seen larva of anopheles in the water butts within the houses. The females of anopheles domesticating in our dwellings have been found exceedingly seldom, and can by no means account for the numerous cases of malaria observed under our conditions en masse in winter and early spring months."]

C. L.

DOBREITZER (I. A.). [Le paludisme en Russie des Soviets.] [**Malaria in Soviet Russia.**]—*Commissariat Santé pub.* Moscow. 1924. 81 pp. With 3 maps & 8 figs. [Summarized in *Rev. Applied Entom.* 1925. Aug. Vol. 13. Ser. B. Pt. 8. p. 127.]

Reverting to the malarial situation in Russia, it is estimated that the disease caused 60,000 deaths and the loss of 112,500,000 working days during 1923. Anopheles extended to the extreme north and to high altitudes, and they remain active in houses in March and in December.

C. L.

LEAGUE OF NATIONS. **Health Organisation. Malaria in Albania. Report by Dr. W. E. HAIGH dated February, 1925.** C.H. 272.—62 pp.

——. C.H. 272 (*a*).—5 pp.

——. C.H. 272 (*b*).—29 pp. With 1 map.

This minutely-detailed report leads up to a number of reasoned and reasonable recommendations. Malaria is the most prevalent disease in Albania, comprising as much as three-quarters of the sickness treated at public institutions, and affecting mainly the low coastal belt, where subtertian malaria is particularly common. The main incidence lasts from late June to October. Houses are mostly of a type which forms an ideal shelter for mosquitoes, and the incomplete separation of portions set aside for man and animals makes it easy for those attracted by animals to pass on to man. Fumigation, spraying and screening are impracticable in them. Poverty and undernourishment are rife; the State Medical Service is rudimentary; the provision of quinine is inadequate. *Anopheles maculipennis* is the chief vector, breeding in running water up to the end of September.

C. L.

GAGE (E. H.). **Studies of Impounded Waters in Relation to Malaria. The Trend of Malaria in Horse Creek Valley, Aiken County, S.C.**—*Public Health Rep.* 1925. Oct. 16. Vol. 40. No. 42. pp. 2211–2219. [2 refs.]

This narrow valley contains a series of dammed up reservoirs, by which the fall in level is completely used for working cotton mills. Moreover, numerous springs, seepage areas and ditches exist. It has a highly malarious history, and returns show that during the last 10 years 26 deaths are attributable, not perhaps entirely accurately,

to that infection. These ponds contain *Gambusia affinis* and *Fundulus nottii*, the latter predominating, but are heavily stocked with game fish. Judged by the dipper, four times as many larvae inhabit the casual waters as the reservoirs. There emerged eventually *Anopheles crucians*, *A. punctipennis* and *A. quadrimaculatus* in these percentages; from ponds 84, 6 and 10, from casual water 77, 21 and 2. A census of 1254 persons produced a history of malaria in 43 per cent., with recent attacks in 12 per cent. In 111 children examined, no enlarged spleens and no positive blood films were found. Local medical practitioners, mill officials, and visitors to summer camps agree that malaria is not of great importance.

C. L.

DE BELLARD (E. P.). Malaria.—Trabajo leido en la Academia de Medicina en la sesión del dia 2 de julio de 1925. [**Malaria in Venezuela.**]—16 pp. 1925. Caracas: Tipografia Americana.

A general and up-to-date survey of general knowledge for loca use. Round the Lago de Maracaibo malarial incidence is as high as 100 per cent. The maximum prophylactic dose over a long period is put at 0·65 gm. quinine daily, and the constant failure of its effectiveness is noted. The splenic index is as high as 52, and the parasite index 48. *P. vivax* comprises 83, and *P. falciparum* 17 per cent. of infections. Treatment follows accepted lines.

C. L.

VITETTI (G.) & POLLITZER (R.). Stato degli organi ematopoietici nell' infezione malarica del bambino. [**The Haemopoietic Organs in the Malarial Infection of Children.**]—*Pediatria.* 1925. Sept. 15. Vol. 33. No. 18. pp. 973–978.

In 20 malarial children from one month to four years old, the cellular constituents of the bone marrow and blood were compared. Haemopoietic activity was intense. Malaria parasites were never encountered within erythroblasts or other immature red cells. Large mononuclears were almost constantly increased in the peripheral blood. The excess of these cells there and of eosinophils in the medulla indicates their prevalent origin from the reticulo-endothelial tissue and the marrow respectively.

C. L.

KERVRANN. L'urobilinurie dans le paludisme. **Urobilinuria in Malaria.**]—*Ann. de Méd. et de Pharm. Colon.* 1925. May–June–July–Aug. Vol. 23. No. 2. pp. 340–342. [1 ref.]

Schlesinger's solution, 10 per cent. of acetate of zinc in alcohol, is thoroughly shaken, mixed with an equal quantity of the suspected urine, a few drops of weak tincture of iodine added, and the whole filtered. The filtrate is fluorescent if urobilin be present. ATKINSON holds that this reaction is diagnostic of malaria. Kervrann found it positive in 72 per cent. of microscopically established cases of malaria, the percentages being 70 for *P. falciparum*, 83 for *P. vivax*, and 75 for *P. malariae*. It was present in all of 3 cases of pneumonia, and in 4 of 5 large abscesses. It was, therefore, not specific.

C. L.

Macciotta (G.). Contributo allo studio delle forme atipiche della malaria nei bambini. [**Atypical Malaria in Children.**]—*Pediatria.* 1925. Nov. 1. Vol. 33. No. 21. pp. 1151–1169. [16 refs.]

In the cases of three small children infected with tertian malaria the temperature, during observation, did not rise above 37·2° C. In two, the minimum temperature coincided with sporing. In the third a few purpuric spots appeared, with tertian rhythm, during sporogony.

C. L.

Coglievina (Benvenuto). Herpes Zoster und latente Malaria. [**Herpes Zoster and Latent Malaria.**]—*Wien. Klin. Woch.* 1925. Sept. 17. Vol. 38. No. 38. pp. 1034–1035. [29 refs.]

A man of 56 developed several crops of herpes zoster, and subsequently fever with the discovery of tertian malaria parasites. Consideration of this case and of the literature leads the writer to the conclusion that latent malaria predisposes to the attack of the unknown infective agent of herpes zoster, that the nerve distribution of this corresponds to the zone of the liver which is sympathetically affected via the coeliac plexus, which, by stimulation of the spleen, floods the blood with plasmodia.

C. L.

Caro. Accidents secondaires mortels de la chloroformisation chez un ancien paludéen. [**Fatal Post-Chloroform Poisoning in a Case of Old Malaria.**]—*Ann. de Méd et de Pharm. Colon.* 1925. May–June–July–Aug. Vol. 23. No. 2. pp. 350–352.

Immediately on coming-to from a prolonged herniotomy under chloroform a man of 45, with a history of malaria 17, and of severe ankylostomiasis 5, years earlier, experienced violent hepatic pain with nausea. There followed, localized mid-axillary hepatic swelling, jaundice, retention of urine, respiratory difficulty with some basal crepitation. At death on the 10th day, the firm elastic rather small liver had a grayish mahogany colour, and on section showed naked-eye evidence of interlobular cirrhosis with diffuent parenchyma. The suggested diagnosis is acute yellow atrophy of the liver supervening on malarial cirrhosis. [There was apparently no evidence of malaria, but the case seems to have a bearing on carbon tetrachloride poisoning.]

C. L.

Wesenhagen (G. F.). Hersenverschijnselen bij malaria. [**Cerebral Symptoms in Malaria.**]—*Nederl. Tijdschr. v. Geneesk.* 1925. Aug. 8. Year 69. 2nd Half. No. 6. pp. 763–764.

In a man of 54, abdominal pain, vomiting, discomfort over the bladder, cerebral confusion and an epileptiform attack, and in a boy of 9, indistinct speech and a palsied arm, cleared up under quinine after malaria parasites had been detected in blood films.

C. L.

Slot (J. A.). Phagocyteerende reticulo-endotheliën in het perifere bloed in een geval van malaria. [**Phagocytic Reticulo-Endothelial Cells in the Peripheral Circulation in a Case of Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1925. Vol. 65. No. 4. pp. 458–460. With 1 plate.

The typical samples of these cells were found by the author only during a very short period of the disease (not longer than a couple of

hours). A great number of erythrocytes was infected and the author therefore believes that a temporary failure of the spleen to perform its functions caused a proliferation of the reticulo-endothelial system in the liver, with subsequent liberation of a few of the cells.

W. J. Bais.

Morin (Henry G. S.). Myélémie dissociée transitoire chez une paludéenne. [**Myelocytes in Malaria.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. Nov. 19. Year 41. 3rd Ser. Vol. 49. No. 34. pp. 1419–25.

There accompanied this attack of fever, caused by *P. vivax* "in the haemogregarine stage," corpuscles described as promyelocytes and myelocytes. The former are described as having a round or somewhat indented nucleus, small, with cytoplasmic granules almost exclusively neutrophil, the latter as larger, with the nucleus more or less deeply cleft. Together they at first comprised about 22 per cent. of the leucocytic total.

C. L.

Biglieri (R.). Formes anormales des gamètes de *Plasmodium falciparum*. [**Unusual Gametes of** *P. falciparum*.]—*C.R. Soc. Biol.* 1925. Oct. 23. Vol. 93. No. 29. pp. 965–966.

In a short note the writer describes from an inhabitant of Tucuman who had received intravenous injection of quinine: (1) Giant crescents measuring 18 by 5 to 6μ, staining normally and readily agglutinated by the serum of malaria patients; (2) Dwarf crescents, 5μ long, with a small, often double, excentric nucleus, with abundant central pigment forming a crown or two crowns, and with nuclei deeply staining with Giemsa.

C. L.

Medical Research Council. Privy Council. Spec. Rep. Series, No. 96. **Clinical Comparisons of Quinine and Quinidine.**—27 pp. [32 refs.] 1925. London: H.M. Stationery Office. [Price 1s. net.]

Acton having concluded (this *Bulletin*, Vol. 18, p. 335) that quinine was specific for subtertian malaria, and that quinidine and cinchonidine were more valuable for the tertian form, a committee consisting of Dr. Andrew Balfour, Col. S. P. James and Major H. W. Acton, with Dr. H. H. Dale as chairman, forwarded to many persons record sheets and specially purified quinine and quinidine, prepared by Messrs. Howards and Sons. The test employed was the time required to free from parasites the cutaneous blood during an attack. An interval of two years has resulted in the return of only 5 record sheets. All reporters conclude that quinidine is at least as efficacious as quinine. There is no clear evidence of any difference between the two alkaloids in toxicity for the patient, and none that the curative actions of these alkaloids are different for the different kinds of malaria parasites.

"The real importance of the conclusion reached is that it deposes quinine from the position of unique value which practice and tradition have

accorded to it among the cinchona alkaloids. A systematic comparison of the other cinchona alkaloids with it, and particularly of cinchonine and cinchonidine, is very much to be desired."

The most detailed of the reports received was from Dr. FLETCHER, of Kuala Lumpur.

C. L.

COOPER (Alexander T.). **Treatment of Malarial Fever.**—*Milit. Surgeon.* 1925. Oct. Vol. 57. No. 4. pp. 392–396.

The treatment adopted was 40 grains of quinine sulphate daily for 5 days, and a 2-days interval. Should fever reappear—a repetition of the same dosage. Should it not—15 grains daily for a month, and 10 grains daily for two months. All doses were given in hospital. After treatment began, tertian parasites remained detectable in the blood, presumably in a thin smear, for an average of 3·25 days, when gametes were, and of 3·4 days when they were not, noted, the limits being 2 to 10 days. The figures for subtertian parasites were: Without gametes, 8·9; with gametes, 11·3 days, with limits of 2 to 23 days. [It is not clear whether the limits refer to gametes only, or whether the strength of the quinine solution was checked.]

C. L.

SINTON (J. A.). **A Clinical Method for the Estimation of the Amount of Quinine in Medicinal Solutions.**—*Indian Jl. Med. Res.* 1925. July. Vol. 13. No. 1. pp. 25–28. [8 refs.]

Perhaps the title might better commence "A Clinical-Laboratory Method." It is insisted that the ready sale for quinine frequently leads in institutions to stock and bedside solutions being below ordered strength, a fact throwing light on a number of reports to the Quinine and Malaria Enquiry that quinine has failed, and the complete lack of success of the Enquiry in discovering any case of quinine resistance when it was established that quinine was actually taken. The method depends on comparing the relative opacity produced by adding to the suspected solution (previously treated to exclude albumin) an equal amount of Tanret's modification of Mayer's reagent, with either the opacity in a series of Brown's tubes (BROWN, H. C., I.J.M.R., 1919, vii, 343), or that produced by the reagent's action on standard quinine solutions. The original contains full details.

C. L.

AVISON (Douglas B.). **Mercurochrome in the Treatment of Chronic Malaria.**—*China Med. Jl.* 1925. May. Vol. 39. No. 5. pp. 419–421.

There were treated 14 cases, 8 being children from 6 years old and upwards, and 6 adults. Twelve were, by smear, "positive for malaria immediately before treatment," while the two negatives had recently taken quinine. The dose of mercurochrome was by a single intramuscular injection of a 1 per cent. solution—0.003 grammes per kilo of body weight. Flushing, headache, a rise in temperature of 1° or 2° C., chilliness or a rigor, and vomiting usually followed the injection. Exceptionally, the urine remained red for three or four days. The blood became "negative for malaria within a few hours." In no case were the symptoms dangerous, and all cases were held cured.

C. L.

Kingsbury (A. Neave) & Kanagarayer (K.). **Mercurochrome 220 in the Treatment of Malaria.**—*Indian Med. Gaz.* 1925. August. Vol. 60. No. 8. pp. 355–357. With 2 charts in text. [4 refs.]

One case of benign and one of subtertian malaria were each treated with three daily intravenous injections of 20 cc. of a 0·5 per cent. solution of mercurochrome 202, a dye and a fluorescent mercurial compound. In each case the administration of mercury was cut short by the appearance of stomatitis; in each the dye caused no alteration in the parasites' staining properties, with, in the tertian case no, and in the subtertian some, diminution in their numbers. Fever and parasites disappeared on the exhibition of quinine. It is considered that the action of mercurochrome on malaria parasites is negligible, and that its unpleasant sequelae contraindicate its use in malaria.

C. L.

Pontano (Tommaso). Il sale sodico dell' acido acetilossiamino-fenilarsinico (stovarsolo sodico) nella malaria. [**Sodium Stovarsol in Malaria.**]—*Policlinico.* Sez. Prat. 1925. Nov. 23. Vol. 32. No. 47. pp. 1631–1637. With 7 charts in text. [2 refs.]

Stovarsol contains 27·2, its sodium salt 20·3, per cent. of arsenic. It may be given by mouth, intramuscularly, or intravenously. Seven cases were treated. In 1 infection was by *P. vivax*, in 4 by *P. falciparum*, in 2 the point is not noted. In all instances the blood immediately became negative. In this stage the *P. vivax*, one *P. falciparum*, and one unnoted infection left hospital. In the other cases parasites reappeared during continued oral administration of the drug in gramme doses, and had to be removed by quinine.

C. L.

Valenti (F.) & Tomaselli (A.). Lo Stovarsolo nella cura della malaria. II. Nota. [**Stovarsol in Malaria.**]—*Policlinico.* Sez. Prat. 1925. Nov. 23. Vol. 32. No. 47. pp. 1629–1631. With 5 charts in text.

Three cases of infection with *P. falciparum* were treated with stovarsol, two or three tablets daily. The alarming condition which ensued in two necessitated the administration of quinine. The third case was of moderate severity and the treatment seems to have been continued for about three months. Parasites remained abundant for over a month, then diminished in numbers, but did not disappear till quinine was given.

Smits (E.). Is Antimoon een geneesmiddel tegen Malaria? [**Is Antimony Remedial in Malaria?**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1925. Vol. 65. No. 4. pp. 518–520. [6 refs.] With 1 folding table.

Smits has given a trial to the organic compounds "Heyden 661," stibenyl and stibosal, which are less toxic than tartar emetic. The results were completely negative, whilst the patients (15 in number) recovered and the parasites disappeared promptly on subsequent administration of quinine.

W. J. Bais.

Boudreau. L'iode dans la tuberculose et dans le paludisme. [**Iodine in Tuberculosis and Malaria.**]—*Jl. Méd. de Bordeaux.* 1925. Nov. 10. Vol. 102. No. 22. pp. 995–997.

Regnault (Jules). Iode ou quinine dans le paludisme. [**Iodine or Quinine in Malaria.**]—*Ibid.* pp. 997–998. [7 refs.]

Boudreau reiterates his statement of the cure of chronic malaria by iodine. The diagnosis was not parasitic. Regnault is equally authoritative in advising quinine administration six hours before the expected attack, with iodine (solution iodo-iodurée) during these. As a preventive he believes that quinine is often inefficacious and is not without risk of lessening working capacity, and producing haemoglobinuria and abortion.

C. L.

Massias (Ch.). L'iode dans le paludisme. [**Iodine in Malaria.**]—*Jl. Méd. de Bordeaux.* 1925. Oct. 10. Vol. 102. No. 19. pp. 819–820. [6 refs.]

Massias points out that in his advocacy of iodine for malaria (this *Bulletin*, vol. 22, p. 827) Boudreau has no use for a parasitic diagnosis.

C. L.

i. Cremonese (Guido). **"Smalarina" in Malaria.** [Correspondence.]—*Lancet.* 1925. Sept. 26. pp. 675–676.

ii. Low (G. C.) & Gregg (A. L.). **"Smalarina" in Malaria.** [Correspondence.]—*Ibid.* Oct. 3. p. 727.

(i) Referring to Low and Gregg's tests of "Smalarina" (this *Bulletin*, vol. 22, p. 819) Cremonese states definitely that smalarina is unsuited for acute malaria. He maintains that it produces a "biological therapy" and leads to organic reaction and immunity, sometimes late in appearing and "very often associated with a feverish reaction" and resulting in rapid diminution of splenic enlargement and gradual improvement in health when the treatment is completed. He urges that no clinical control was carried out by the use of quinine alone, and that the rapid recovery and diminution of the spleen which followed the administration of quinine in Low and Gregg's cases is too surprising to be due to quinine.

(ii) Low and Gregg reply that their controls were their numerous patients admitted to the Tropical Diseases Hospital during the past several years, and that the cases they quote made the *usual* progress under quinine—no worse and no better— than did those others. They refer readers to the pamphlet "Smalarina Cremonese" (*tom. cit*, p. 818). [They do not add that Cremonese himself appears to have used no adequate untreated controls to check the results of the application of his therapeutic rules.]

C. L.

Fletcher (William). **The Treatment of Malaria with Peracrina 303.**—*Indian Med. Gaz.* 1925. Nov. Vol. 60. No. 11. pp. 524–527.

The following is the writer's summary:—

"A supply of Peracrina 303 was received from the Haco Company who are the manufacturers. It is put up in pills weighing about 10 grains each. They consist of a mass of yeast cells and a little starch, stained

with a yellow dye. The makers state that 400 pills are required for the treatment of an ordinary case of malaria. The retail price of this quantity, in Singapore, is $24, or two pounds sixteen shillings. Treatment with Peracrina is, therefore, much more costly than treatment with quinine. The optimum dose, according to the makers, is 12 pills a day, and they recommend that this dose should be continued for about three months. Few people will submit to this treatment.

"The Haco Company state that the malaria parasites may increase during the first three weeks of treatment, and the temperature may rise occasionally. This makes Peracrina unsuitable for use in a country where malignant tertian infections are common and where death may ensue with shocking rapidity unless the number of parasites is rapidly reduced.

"A report by Dr. J. Walker on the treatment of malaria with Peracrina, was sent to me by the makers; it was published originally in the *Archiv für Schiffs- und Tropen-Hygiene*. The examples of cures effected by Peracrina were unconvincing, they did not prove that this substance had any effect on malaria parasites.

"Eighteen patients who were suffering from malaria, in the District Hospital at Kuala Lumpur, were treated with Peracrina. Their average weight was 101 lbs., and they were given 8 pills daily. Blood films were examined twice a day.

"Nine of these patients were given Peracrina alone when they were first admitted to hospital; quinine was not given to them until its administration became imperative. The result was that, in all except one, the number of parasites either increased or remained stationary and it became necessary to give quinine.

"The other nine cases were given quinine at the commencement of treatment, either alone or in combination with Peracrina. As soon as the parasites had disappeared, quinine was discontinued and Peracrina was given alone. In two cases there was no relapse while Peracrina was being given, but they were under observation for only five and eight days, respectively. In the remaining 7 cases the parasites multiplied when the quinine was stopped and Peracrina was powerless to prevent relapse."

C. L.

Ascoli (Vittorio). Risultati di taluni recenti metodi di cura della malaria. [**Some Recent Methods of Treatment in Malaria.**—] *Policlinico*. Sez. Prat. 1925. Aug. 3. Vol. 32. No. 31. pp. 1077–1081. [11 refs.]

For malaria is recommended a mixture containing quinine sulphate, tartrate of potassium and iron, and arsenious acid. It is believed that salvarsan hinders or retards relapses. Cinchonine and quinine may be substituted one for the other, particularly if tolerance or intolerance show themselves. X-rays are no specific cure for malaria, but exercise, perhaps, an indirect and adjuvant effect. Regarding smalarina it is noted that the pseudo-scientific press and political journals have trumpeted it abroad. It was given as advised by the author—that is, 6 or 8 tablets a day for a month at the price of 20 lire a tablet. It induced nausea and diarrhœa, in spite of being camouflaged by wafers and pseudonyms, was accompanied by access of fever with restlessness and delirium, and quinine had to be called in to cut the illness short.

C. L.

Ovazza (V. E.). Sulla permanenza di gametociti degli ematozoi malarici. [**On the Permanence of Malarial Gametocytes.**]—*Ann. d'Igiene*. 1925. May. Vol. 35. No. 5. pp. 449–451.

In about a thousand crescents the proportion of male to female elements was 1 to 2, or even 1 to 1 occasionally at the beginning of an

infection, thus contrasting with Stephens and Gordon's figures of 3 to 1 and Knowles's of 10 to 1. It is, however, important to note that Ovazza, writing from the late Professor Grassi's laboratory at Fiumicino, holds that, compared with the descriptions of the greater of the Italian observers, those of German and English authors are contradictory and lacking in precision. The criteria he gives are as follows: Macrogametes; larger, richer in protoplasm and chromatin, pigment more evident and with larger granules, movement absent or nearly so. Microgametes; protoplasm sparse, nuclei refractile with uniform rodlets of chromatin and pigment arranged towards the centre, movement marked especially at exflagellation. Gametocytes have persisted in the circulation in 54 cases from 7 to 55 days, macrogametes persisting longer under quinine treatment than microgametes.

C. L.

Ioff (I.). **On the Method of Morphological Studies of Malaria Parasites.** —*Rev. Microbiol. & Epidémiol.* 1925. Vol. 4. No. 2. English summary pp. 114–115. With 15 figs. on 1 plate. [In Russian pp. 77–82.]

The ordinary method of examination for malaria parasites, the dried smear, is employed for no other protozoon. The influence of drying was accordingly investigated. It is concluded that rapid drying minimizes, and slow drying intensifies, the Romanowski stain, including Schuffner's and Stephens-Christophers-Mauer's dots. Young parasites, slowly dried, form sharply outlined regular rings with compact chromatin; rapidly dried they have whimsical amoeboid outlines with loose chromatin. Crescents slowly dried—and slowly dying—in a moist chamber, may take on characters resembling those of gametes of *P. vivax*. From the summary it appears to be held that spherulation and flagellation may occur in the peripheral blood, but it is at least stressed that the drying of a film is a varying matter, giving under different conditions varying and confusing results.

C. L.

Samsonoff (P. F.). Zur Frage ueber einige morphologische Besonderheiten der Parthenogenese und die Bedeutung derselben bei den späteren Rezidiven der Malaria. [**Morphological Peculiarities in Parthenogenesis and their Significance in Late Relapses of Malaria.**]—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Sept. 15. Vol. 96. No. 2. pp. 109–114. With 20 figs. on 2 plates. [17 refs.]

The writer publishes a two-page plate of coloured figures purporting to distinguish double infections of erythrocytes from parthenogenesis. On the evidence one is fully entitled to hold either opinion. The extraordinary variety in appearance which Minchin (*Quarterly Jl. Micr. Sc.*, 1909, viii, 755) and Ioff (above) have shown to attend variety in mode of preparation of blood protozoa requires more consideration than it commonly receives.

C. L.

Asbelew (W. N.). Ein Beitrag zur Wassermannschen Reaktion bei Malaria. [**Wassermann Reaction in Malaria.**]—*Cent. f. Bakt.* 1. Abt. Orig. 1925. Sept. 15. Vol. 96. No. 2. pp. 114–118. [10 refs.]

The writer concludes that in malaria a fleeting Wassermann reaction coincides with the presence of parasites in the blood, and is not present in chronic malaria without parasites. The list of references should not be taken as a guide to the work that has been done by others on this matter.]

C. L.

Epstein (H.) & Rubinstein (B.). Beiträge zur experimentellen Malariaforschung (Immunitätsfragen, Chininwirkung). [**Experimental Work on Malaria. Immunity and Action of Quinine.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 76–87.

The writers have repeated the experiments telling against the direct action of quinine in malaria, by injecting blood incubated in quinine solution at 37° C. into paralytics. Solutions of 1 in 5,000 were infective after being mixed for an hour and a half, and one of 1 in 500 after three hours and ten minutes. The action is then indirect. If the explanation lie in the formation in the organism of some curative metabolite of quinine it is unknown. Alternatively, quinine effects the production of an immune body. A case is instanced [others are familiar to readers of the *Bulletin* where four injections of malarial blood failed to produce illness although, as a footnote indicates, there was a fleeting detection of parasites in the cutaneous blood 35 days after the last injection. It is held that some antibody must be present in these cases, and that quinine must be held to act in the same way. Passing to autohaemotherapy, it is advanced that when a man's infected blood is drawn off, and re-injected subcutaneously, some parasites will die and a vaccine be formed. Of 70 persons so treated, sixty per cent. were held to be bettered, 20 to be worsened and 20 unchanged. The bettering consisted, not in any lessening of sufficiently grave symptoms, but in the observation that 0·5 to 1 gm. of quinine retarded the next malarial attack for two to sixteen weeks, the interval among non-injected cases of the series being unmentioned. It is believed that in injected cases gametes are found earlier than in others, which natural change the writer looks upon as evidence of specific resistance by the organism—and so as confirming his view.

C. L.

Monteleone (Remo). Il liquido cefalo-rachidiano nella malaria. [**Cerebrospinal Fluid in Malaria.**]—*Policlinico.* Sez. Med. 1925. Sept. 1. Vol. 32. No. 9. pp. 470–476. [28 refs.]

In 47 cases examined the cerebrospinal fluid was, in chronic malaria, unaltered, while in acute malaria it was under high pressure and contained more sugar than normal, with, in some instances, an increase in albumin and lymphocytes.

C. L.

YORKE (Warrington). **Further Observations on Malaria made during Treatment of General Paralysis.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1925. June 18. Vol. 19. No. 3. pp. 108–122. [9 refs.]

Warrington Yorke brings up to date the histories of his earlier cases (this *Bulletin*, Vol. 22, p. 50), and adds to their number. The same parasitic strain has been used throughout, passed alternatively by injection and mosquito. It has in certain cases been carried on by injection directly from patient to patient over three years and by forty transfers. Gametocytes not only persist, but exflagellate, and *Anopheles maculipennis*, fed on patients of the 35th, 40th and 41st passages, have developed oocysts, but, unfortunately, died before sporozoites could form.

The treatment of all cases was by 30 grains [2 gms.] of quinine daily for three days. Under this, 2 per cent. of injected, and 57 per cent. of naturally infected cases relapsed. These relapses occurred: in the first month, 2, second 2, third 1, fourth 1, fifth 3, sixth 2, eighth 3, ninth 3, tenth 3, eleventh 1. In 4 of the 21 relapses, parasites spontaneously and permanently disappeared (observed 162 to 319 days); in 2, disappearance followed 10 grains of quinine (215 and 237 days); in 4, it followed the usual six-gramme course of quinine (37 to 391 days); in 4, one or two relapses occurred, but passed off without treatment; in 4, one or two relapses followed this course of quinine and were similarly treated (253 to 444 days); one died during a relapse; 2 are too recent for report.

There is, it is held, almost overwhelming evidence that appearance of relapses is largely independent of dosage of quinine, they have occurred irrespective of season, and the strain has been the same. The patient's individuality is then held to determine their occurrence. The hypothesis is restated, that quinine never destroys all the parasites, but that those which it does kill, by producing soluble antigen stimulate the host to the production of antibody.

That blood is infective after incubation for two and a-half hours at 37° C. with an equal quantity of a 1 in 5,000 quinine solution is confirmed. There is, it is noted, evidence that quinine is useless when the blood is negative. For instance, during the War, it was noted at Liverpool that [in relapsing cases] fifteen grains of quinine on each of two consecutive days invariably removed fever and parasites from the blood for at least 8 days. This double dose, however, administered weekly over long periods, did not prevent relapse within the eight-days' interval in about half the cases.

It was not, in the earlier abstract, sufficiently emphasized that 10 grains of quinine daily from 5 days before to 7 days after an infective feed failed as a prophylactic. Infection could only be prevented by continuing the treatment for at least 10 days after the infective feed. In other words, quinine proved prophylactically ineffective against sporozoites. The collateral evidence suggesting that prolonged administration of quinine may exhaust the immunity-producing cells is mentioned.

C. L.

DAVIDSON (T. Wishart). **Treatment of General Paralysis by Malaria.**—*Jl. Mental Science.* 1925. July. Vol. 71. No. 294. pp. 486–490. [5 refs.]

Malaria reached Winwick Mental Hospital in *A. maculipennis* supplied by YORKE ready infected with an Indian strain of *P. vivax*.

Of 53 cases infected, 23 were by mosquitoes, 30 by injection (intravenous 16, intramuscular 13, subcutaneous 1). Incubation periods, shortest, average and longest, were: By mosquitoes, 7, 14, 20; intravenous, 4, 7, 19; intramuscular, 10, 16, 23; subcutaneous, 20. Ten rigors were aimed at, but in thirty cases quinine (30 grains daily for three days) had to be used earlier to cut short the attack. Of the mosquito infections 56 per cent. relapsed, of the inoculations 3·3. Infection was invariable. Three cases merit note. All had had previous malaria, two certainly mosquito-borne (one naturally), the method of infection in the third being unmentioned. After "re-infection" all showed parasites, but none had fever, although in two cases at least it is probable that the first infection still persisted.

C. L.

Graham (Norman B.). **The Malarial Treatment of General Paralysis.**—*Jl. Mental Science.* 1925. July. Vol. 71. No. 294. pp. 424–431.

Therapeutic tertian malarial infection, subcutaneously induced, was a factor in causing the death of 5 of 56 cases, for 2 of them developed pneumonia within 7 days of the termination of this treatment, and the 3 others died directly of exhaustion. The strain was Yorke's from Whittingham, brought over in infected mosquitoes. Of the paralytics 36 were discharged from the institution cured.

C. L.

Schulze. Die Malariabehandlung der Paralyse. [**Malaria Treatment of Paralysis.**]—*Deut. Med. Woch.* 1925. Nov. 6. Vol. 51. No. 45. pp. 1856–1858.

A tertian strain of Plehn's ran through 80 passages, and appeared gamete-free. Another, started in 1923, has run through 50 passages with gametes. It was conveyed by injection, subcutaneous or intravenous, the incubation period being 6 to 17 days with the former and 4 to 10 with the latter. Treatment was by 3 grammes of quinine over three days (1·2, 1·2, 0·6). No relapses were observed.

C. L.

v. Engel (Rudolf). Die Uebertragbarkeit der Impfmalaria durch Anopheles. [**Transmissibility of Inoculation Malaria by Anopheles.**]—*Deut. Med. Woch.* 1925. Oct. 16. Vol. 51. No. 42. pp. 1738–1739.

Gametes remained numerous in the strain of *P. vivax* used, and mosquitoes were infected from the eighteenth passage made from man to man by injection.

C. L.

Trömner (Ernst) & Baltzer (Hans). Spontanruptur der Milz bei Impfmalaria. [**Spontaneous Rupture of the Spleen in Inoculation Malaria.**]—*Klin. Woch.* 1925. Vol. 4. No. 45. pp. 2159–2160. [12 refs.]

A tabetic of 61 was injected with malaria [presumably *P. vivax*]. After six quotidian febrile attacks he felt wretched, vomited, complained of abdominal pain running to the left shoulder. The spleen was enlarged

and tender. Collapse and death revealed about three-quarters of a litre of blood in the abdominal cavity, a spleen measuring 13 by 9 by 7 cm., weighing 410 gms., and having a fibrous capsule with three rents anteriorly, 0·5 to 10 cm. long. It was a typical malaria spleen. Trauma, it is held, can be definitely excluded.

C. L.

Bering (Fr.). Die Impfmalaria zur Behandlung der Tabes. [**Inoculation Malaria in the Treatment of Tabes.**]—*Muench. Med. Woch.* 1925. Aug. 28. Vol. 72. No. 35. p. 1455.

This paper is without malarial interest, but it is noteworthy that, although some of the tabes cases were uninfluenced, in others improvement was most striking.

C. L.

Marie (A.). Traitement de la paralysie générale par le paludisme. [**Malaria and General Paralysis.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1925. June 18. Year 41. 3rd Ser. Vol. 49. No. 21. pp. 898–899.

From the neurosis viewpoint injection of the spirillum of relapsing fever is advocated as more effective than malaria.

C. L.

Schut (W.). Over een merkwaardig lang latent gebleven geval van malaria. [**A Case of Long Latent Malaria.**]—*Nederl. Tijdschr. v. Geneesk.* 1925. Nov. 14. 69th Year. 2nd Half. No. 20. pp. 2217–2218.

What appears to be the first reported case of malaria from Vlieland Island occurred in a man of 57 with a perplexing illness, finally determined on thick drop examination to be tertian malaria. He denied that he had ever been in the tropics, or off the island for the last 7 years; but when malarial parasites were discovered suddenly remembered that he had spent three weeks in Amsterdam a year earlier.

C. L.

Brás de Sá (L. J.). Malaria na India Portuguesa. Endemia malarica no Concelho de Sanguem. [**Malaria in Portuguese India.**]—*Arquivos Indo-Portugueses de Med. e Hist. Nat.* Nova–Goa. 1925. Vol. 2. pp. 113–124. With 3 plates.

de Mello (Froilano), Brás de Sá & de Menezes (Caetano Francisco). Malaria no Concelho de Sanquelim.—*Ibid.* pp. 170–177. With 5 plates.

These reports from adjacent Districts in Portuguese India show, by a long series of charts and maps, the local splenic index, quantitative and qualitative, and the anopheline breeding places in Bicholim. The splenic index varies from 10 to 100 per cent.

C. L.

Swellengrebel (N. H.). De Malariabestrijding in Palestina. [**Anti-malarial Measures in Palestine.**]—*Nederl. Tijdschr. v. Geneesk.* 1925. Sept. 26. 69th Year. 2nd Half. No. 13. pp. 1422–1432. [1 ref.]

Much of the information contained in this paper has already been noted in this *Bulletin*. The intricacy of the work is emphasized by the existence of over 10,000 registered possible anopheline breeding

places in Jerusalem, and over 3,000 in Haifa. The effects which have been produced are indicated by the following reductions of the spleen rate between about 1919 and 1924; Tiberias 44·5 to 5, Saffad 69 to 17·5, Beisan 40 to 22, Jericho 60 to 35, Hebron 37 to 2, Tel el Turmas 100 to 50, Ramleh 11 to 5, Gaza 2 to 0·2, Jerusalem 47 to 1, Jaffa 6·5 to 1·4–5, Haifa 45 to 4. This antimalarial work is held up as an encouraging model.

C. L.

YAFE (Hillel). **The Problem of Quinine Prophylaxis.**—*Harefuah.* Jerusalem. 1925. Apr. Vol. 1. No. 4–5. English summary pp. I–III. [In Yiddish pp. 163–170.]

Opposing the conclusions of KLIGLER, Yafe urges that the systematic ingestion of 5 to 10 grains of quinine reduces the possibility of infection with *P. vivax* (MAYNE, WENYON, Vol. 19, p. 98), and is the antimalarial measure of primary value. The exceptions are highly malarious, sparsely populated districts where medical relief is adequate, and moderately malarious ones with an enlightened population. Isolation, during sleep, of gametocyte carriers is suggested. In the meantime the malaria rate of those taking, and those not taking, prophylactic quinine should, it is urged, be compared. It is, perhaps, not realized that this has not infrequently been done already.

C. L.

i. PENTMAN (I.). Ein Beitrag zur pathologischen Anatomie der Malaria tertiana. [**Morbid Anatomy of Tertian Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Sept. 1. Vol. 29. No. 9. pp. 436–443. [13 refs.]

ii. KROPVELD (A.). **Malaria.**—*Nederl. Tijdschr. v. Geneesk.* 1925. Aug. 8. Year 69. 2nd Half. No. 6. p. 764.

iii. NOCHT (B.). Ueber Malariabekämpfung. [**Antimalarial Measures.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Oct. 15. Vol. 29. No. 10. pp. 461–470. [1 ref.]

iv. RISQUEZ (F. A.). Le signe du pigment hématique. [**Blood Pigment in Malaria.**]—*Rev. Méd. et Hyg. Trop.* 1925. Sept.–Oct. Vol. 17. No. 5. pp. 204–207.

v. AFFRE. Le pouls comme moyen clinique de diagnostic entre le paludisme et l'infection du post-partum. [**Distinction between Malaria and Puerperal Fever by the Pulse.**]—*Bull. Soc. Path. Exot.* 1925. Oct. 14. Vol. 18. No. 8. pp. 685–687. With 2 charts in text.

vi. ASCOLI (Vittorio). La terapia specifica della malaria. [**Specific Treatment of Malaria.**]—*Policlinico.* Sez. Prat. 1925. Oct. 19. Vol. 32. No. 42. pp. 1453–1461.

vii. UNGER (Rudolf). Erfolgreiche Behandlung einer an schwerer progressiver Paralyse erkrankten Schwangeren mit Impfmalaria. [**Successful Treatment of a Pregnant Case of General Paralysis by Malaria.**]—*Med. Klin.* 1925. Oct. 2. Vol. 21. No. 40. pp. 1498–1500. [1 ref.]

viii. DUPUY. Prophylaxie quinique. [**Quinine Prophylaxis.**]—*Bull. Méd. du Katanga.* 1925. June. Vol. 2. No. 3. pp. 114–115.

i. Among other matters two cases of splenic rupture, one spontaneous, are noted in malaria.

ii. Referring to two cases of indigenous malaria with mental symptoms occurring in Holland (this *Bulletin*, Vol. 22, p. 828) Kropveld reports a third. It is emphasized that malaria is a household and children's disease.

iii. Nocht makes available for German readers the finding of the Malaria Commission of the League of Nations.

iv. Risquez claims to have been the first, in 1893, to have described pigment in the blood in malaria and holds that, if it be correct to describe the detection of pigment in the urine as URRIOLA'S sign (this *Bulletin*, Vol. 21, p. 679), pigment in the blood should be designated Risquez's sign.

v. In the absence of microscopic examination puerperal fever, it is claimed, is distinguishable from malarial fever by the failure of the pulse to follow the temperature in the former; it remains rapid in spite of a fall in the temperature.

vi. The value of quinine and other cinchona alkaloids is emphasized, whatever be their mode of action.

vii. The malarial attacks did not disturb a three months pregnancy.

viii. A series of *ex parte* statements is favour of prophylactic quinine.

C. L.

BATTAGLIA (Mario). Alcune osservazioni cliniche ed anatomo-patologiche sull' infezione malarica.—*Riforma Med.* 1925. July 27. Vol. 41. No. 30. pp. 705–706.

DATTNER (Bernhard). Ueber die Bedeutung des Salvarsans als Abschluss der Malariabehandlung der progressiven Paralyse.—*Klin. Woch.* 1925. Sept. 10. Vol. 4. No. 37. 1771–1774.

HAPKE (Fritz). Die Malariabekämpfung in Emden (Ostfriesland) und Umgebung.—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 151–154.

INGRAM-JOHNSON (R. E.). Vaccine Treatment of Splenomegaly in Chronic Malaria.—*Brit. Med. Jl.* 1925. Aug. 15. p. 293. With 3 text figs.

KLIGLER (I. J.). Source of Malaria in Palestine.—*Harefuah.* Jerusalem. 1925. Apr. Vol. 1. No. 4–5. English summary pp. IV–V. [In Yiddish pp. 173–180.]

PITTALUGA (G.). La obra social antipalúdica.—*Siglo Méd.* 1925. Aug. 15. Year 72. Vol. 76. No. 3740. pp. 153–156. [1 ref.]

RODENWALDT (Ernst). Malaria und Küstenform.—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 1. pp. 292–304. With 5 text figs.

SPAGNOLIO (Giuseppe). Alcune modificazioni del sangue nei malarici trattati coi raggi X.—*Haematologica.* 1925. Apr. Vol. 6. No. 2. pp. 142–155.

REVIEWS AND NOTICES.

RODENWALDT (Ernst) & ESSED (W. F. R.). Untersuchungen ueber die Malaria in Tandjong Priok. [**Malaria Investigations at Tandjong Priok.**—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1925. Vol. 29. No. 4. 49 pp. With 19 charts & 1 folding plan.

This paper contains an account of anti-malarial work carried out by the authors at Tandjong Priok, near Batavia. In consequence of the gradual silting up of the old port it became necessary to make a new one. For this a tract of low-lying land was selected, composed of sand dunes, separated by numerous creeks and mangrove swamps; the work was still incomplete in 1921. The level of the land was slightly raised by the deposit on it of dredgings obtained from the various basins of the port; in many places the elevation was not more than one meter above highwater mark. This was the condition of the site of the quarters, known as Kampong Kodja, occupied by the native personnel. To the east, and within half a kilometer of the coolie lines, are numerous fishponds, most of which contain more or less brackish water; to the south, there is an extensive area of old disused ricefields; and to the west, mangrove swamps.

The unsatisfactory state of health among the coolies on the harbour works soon gave rise to much anxiety. The majority consists of labourers from Batavia and Bantam, who, as a rule, only work for a few weeks or months, and return to their homes as soon as they are satisfied with the amount of their earnings; it is, therefore, very difficult to control them. Thus, of 2,750 persons examined in November, 1921, it was only possible to keep 250 under continual observation for 10 months. Many of the coolies are already infected with malaria when they first arrive. The total mortality for the three years 1919–21 averaged 84 per mille; in 1921, it was 96 per mille. It was evident that the great prevalence of malaria was chiefly responsible for this high morbidity. The average strength of the personnel is not given, but it seems to be large.

A preliminary survey had established the fact that *Anopheles ludlowi* Theobald, was the chief carrier, and search was made for its breeding haunts. At first the fishponds and old ricefields were examined, and were found to contain numerous larvae. Of 36,000 larvae collected, about 5,000 were *A. ludlowi*; and of 27,000 adult mosquitoes caught in the coolie lines, over 6,000 were of this species. It was expected by the authors that the coolies who occupied the barracks nearest to the fishponds and rice-fields would be the most heavily infected with malaria; and that the numbers of adult *A. ludlowi* would be largest in the same quarters: the reverse was found to be the case. Apparently it was only after this experience that attention was directed to the state of things close at hand, in the badly constructed drains intersecting the coolie quarters. These drains always contained many puddles of stagnant water, in which very large numbers of larvae were caught; the adults reared from these were almost exclusively *A. ludlowi*. The drain water was much fouled with human excreta, a condition which was found to be favourable to the development of this mosquito. In the laboratory there was no difficulty in rearing *A. ludlowi* in tap-water, or even distilled water, in which small pieces of meat were allowed to decompose.

There are some other interesting observations on the bionomics of *A. ludlowi*, though, perhaps, none of them are quite new.

Small numbers of mosquitoes were dissected at intervals during the season, and the stomachs were examined for oocysts. Of one batch of 13 *A. rossii* Giles, one was found to be naturally infected; while, at the same time, of 94 *A. ludlowi* 8 contained oocysts. In all, among 3,515 *A. rossii*, there were 12 natural infections; and among 840 *A. ludlowi*,

14 infections. A few other anophelines were examined at various times (*sinensis*, *tessellatus*, *barbirostris*, and *vagus*); none were found to be infected.

The authors consider that the chief carrier of malaria at Tandjong Priok is *A. ludlowi*, and that *A. rossii* plays a part—at times a considerable one—in the dissemination of the disease: they are also of opinion that the fishponds and rice-fields are of little importance.

The measures undertaken to deal with the endemic were on the usual lines, where ideal conditions cannot be obtained. As soon as the drains were regularly treated with paraffin the incidence of malaria declined very considerably.

The observations recorded in this paper only cover a period of ten months, from November, 1921, to September, 1922; the authors are perhaps unduly optimistic in attributing the undoubted improvement in the health of the community that occurred during the summer months entirely to the operations that they initiated and carried out. There are many possible causes of tropical anaemia besides malaria, but the only other one to which the authors make a very brief reference is ankylostomiasis; they consider that this condition was not an active factor in the causation of the anaemia that they found, and, having dismissed this, assume that the low haemoglobin-index was entirely due to malaria. They appear to pay little regard to the usual seasonal improvement in the parasite-rate and haemoglobin-index of a malarious community, or to the fact that malaria is less prevalent in some years than in others. It is only fair to state, however, that the improvement in the public health that began in 1922 was more than maintained in 1923, the last year of which any record is given.

H. J. Walton.